Z KRAJU

TWORZYWA W LICZBACH

Tabele 1–4 zawierają dane dotyczące wielkości produkcji surowców i półproduktów chemicznych (tab. 1) oraz najważniejszych tworzyw polimerowych i polimerów (tab. 2), a także wybranych wyrobów z tworzyw polimerowych (tab. 3) i gumy (tab. 4) w październiku 2024 r.

T a b e l a 1. Produkcja surowców i półproduktów chemicznych w październiku 2024 r., t
T a b l e 1. Production (tons) of raw materials and chemical intermediates in October 2024

Artykuł	Średnia miesięczna w 2023 r.	Październik 2024 r.	Razem I–X 2024 r.	% I–X 2024/ I–X 2023
Węgiel kamienny	4 044 108	4 193 864	36 443 551	91,5
Węgiel brunatny	3 341 267	3 573 189	33 804 163	103,6
Ropa naftowa – wydobycie w kraju	54 015	31 523	466 403	87,8
Gaz ziemny – wydobycie w kraju (tys. m^3)	417 026	373 811	3 957 984	96,8
Etylen	25 017	35 728	298 542	112,0
Propylen	24 584	26 060	333 237	133,6
1,3-Butadien	4 124	0	43 514	101,0
Fenol	3 245	3 420	31 629	98,2
Izocyjaniany	175	184	2 533	144,18
ε-Kaprolaktam	7 581	8 612	87 078	115,4

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T a b e l a 2. Produkcja najważniejszych tworzyw polimerowych i polimerów w październiku 2024 r., t
T a b l e 2. Production (tons) of major polymer materials and polymers in October 2024

Tworzywo polimerowe/polimer	Średnia miesięczna w 2023 r.	Październik 2024 r.	Razem I–X 2024 r.	% I–X 2024/ I–X 2023
Tworzywa polimerowe	237 521	277 910	2 692 787	110,3
Polietylen	22 580	30 736	258 046	114,5
Polimery styrenu	13 557	13 630	123 598	92,7
Poli(chlorek winylu) niezmieszany z innymi substancjami, w formach podstawowych	12 979	25 860	201 530	129,4
Poli(chlorek winylu) nieuplastyczniony, zmieszany z dowolną substancją, w formach podstawowych	3 351	3 157	34 601	98,9
Poli(chlorek winylu) uplastyczniony, zmieszany z dowolną substancją, w formach podstawowych	7 468	8 157	85 293	111,6
Poliacetale, w formach podstawowych	15	14	164	133,3
Glikole polietylenowe i alkohole polieterowe, w formach podstawowych	7 393	8 197	76 581	102,2
Żywice epoksydowe, w formach podstawowych	1 018	1 046	9 475	86,3
Poliwęglany	1 456	1 604	16 127	104,4
Żywice alkidowe, w formach podstawowych	1 849	1 788	23 007	116,1
Poliestry nienasycone, w formach podstawowych	8 048	8 076	78 691	105,8
Poliestry pozostałe	4 871	5 521	50 690	96,7
Polipropylen	22 139	29 737	271 179	121,5
Polimery octanu winylu w dyspersji wodnej	2 402	4 022	37 561	150,3
Poliamidy 6; 11; 12; 66; 69; 610; 612, w formach podstawowych	13 081	16 461	176 296	134,3
Aminoplasty	15 977	23 147	205 517	119,8
Poliuretany	2 419	2 154	17 015	99,4
Kauczuki syntetyczne	19 666	1 304	11 625	111,2

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T a b e l a 3. Produkcja wybranych wyrobów z tworzyw polimerowych w październiku 2024 r.
T a b l e 3. Production of some polymer products in October 2024

Wyrób	Jednostka	Średnia miesięczna w 2023 r.	Październik 2024 r.	Razem I–X 2024 r.	% I–X 2024/ I–X 2023
Wyroby z tworzyw polimerowych	tys. zł	7 085 620	14 473 976	101 607 343	140,4
Rury, przewody i węże sztywne z tworzyw polimerowych	t	2 756	27 523	282 120	98,8
w tym: rury, przewody i węże z polimerów etylenu	t	11 031	10 907	107 096	94,1
rury, przewody i węże z polimerów chlorku winylu	t	8 404	9 953	90 187	101,6
Wyposażenie z tworzyw polimerowych do rur i przewodów	t	4 225	4 605	44 830	104,9
Płyty, arkusze, folie, taśmy i pasy z polimerów etylenu, o grubości < 0,125 mm	t	45 569	46 561	525 227	115,2
Płyty, arkusze, folie, taśmy i pasy z polimerów propylenu, o grubości ≤ 0,10 mm	t	10 867	14 246	147 133	126,2
Płyty, arkusze, folie, taśmy i pasy z komórkowych polimerów styrenu	t	33 815	45 787	371 102	104,6
w tym: do zewnętrznego ocieplania ścian	t tys. m²	12 770 9 105	17 594 11 941	137 047 92 776	1014 96,2
Worki i torby z polimerów etylenu i innych	t	245 945	29 492	272 857	109,0
Pudełka, skrzynki, klatki i podobne artykuły z tworzyw polimerowych	t	25 565	26 939	245 445	105,2
Pokrycia podłogowe (wykładziny), ścienne, sufitowe	t tys. m²	7 096 1 907	9 112 2 199	89 379 22 246	124,5 115,0
Drzwi, okna, ościeżnice drzwiowe	t tys. szt.	41 658 742	58 670 1 011	461 364 8 084	110,2 108,2
Okładziny ścienne, zewnętrzne	t tys. m²	313 117	359 126	3 120 1 114	97,5 93,8
Kleje na bazie żywic syntetycznych	t	1 385	10 329	59 735	253,3
Kleje poliuretanowe	t	1 382	1 714	15 224	106,9
Włókna chemiczne	t	2 652	3 069	29 281	107,8
Tkaniny kordowe (oponowe) z włókien syntetycznych	t tys. m²	1 194 3 808	1 469 4 215	13 910 43 945	113,7 112,7
Nici do szycia z włókien chemicznych	t	40	43	391	94,2

Wg danych GUS.

T a b e l a 4. Produkcja wybranych wyrobów z gumy w październiku 2024 r.
T a b l e 4. Production of some rubber products in October 2024

Wyrób	Jednostka	Średnia miesięczna w 2023 r.	Październik 2024 r.	Razem I–X 2024 r.	% I–X 2024/ I–X 2023
Wyroby z gumy, produkcja wytworzona	t	82 308	79 477	770 819	91,3
Opony i dętki z gumy; bieżnikowane i regenerowane opony z gumy	t tys. szt.	41 666 4 388	41 379 5 427	386 014 46 111	90,3 104,9
w tym: opony do samochodów osobowych	tys. szt.	2 353	2 675	22 700	93,8
opony do samochodów ciężarowych i autobusów	tys. szt.	272	256	2 428	90,4
opony do ciągników	tys. szt.	7	6	62	83,9
opony do maszyn rolniczych	tys. szt.	35	37	289	79,5
Przewody giętkie wzmocnione metalem	t	1 612	1 343	15 798	90,7
Taśmy przenośnikowe	t km	4 129 2 316	3 268 2 881	33 431 24 303	81,4 106,3

Wg danych GUS.

mgr inż. Małgorzata Choroś

New automotive factory in Poland

It's official – an international automotive industry corporation will invest in the Żagań Economic Zone. The company in question is CEFA Poland, a subsidiary of the Samvardhana Motherson International group, a global leader in the development and production of automotive components. The company has just purchased over 9 hectares of investment land in the Żagań Economic Zone. A state-of-the-art production facility will be established here, specializing in manufacturing plastic interior components for vehicles, such as dashboards, for leading automotive brands. The construction of the plant in Żagań is a significant step not only for the investor but also for the local Żagań community. "This project is proof of Żagań's professionalism and attractiveness as an investment location," emphasizes Sławomir Kowal, the mayor of Żagań. In the first phase after the plant's launch, the company plans to hire 250 employees, with the total workforce expected to reach up to 400 people. This is a key step in the company's expansion in Europe, where it is already a major player in the automotive industry, providing advanced technological solutions based on plastic injection molding. One in four cars produced in Spain contains CEFA components. The Motherson Group, of which CEFA is a part, operates in 44 countries, managing over 400 facilities and employing more than 190,000 professionals. With its global presence and commitment to innovation, the company has earned customer recognition and numerous awards, including the prestigious Company Excellence Award. The new plant in Żagań will strengthen the group's position in Poland and the Central and Eastern European region. It is worth noting that this is not the Indian giant's first investment in Poland. Through its subsidiary, Samvardhana Motherson Automotive Systems Group BV, the corporation acquired one of the largest employers in Jelenia Góra and Lower Silesia – Dr. Schneider Group – last year. To recall, in early September 2022, Dr. Schneider was forced to declare bankruptcy due to an unsuccessful financial and operational restructuring.

https://eplastics.pl/

BSH invests in a modern factory in Rudna Wielka

BSH Home Appliances Group, one of the largest home appliance manufacturers in Europe, is building a state-of-the-art production plant in Rudna Wielka near Rzeszów, Poland. The investment, worth nearly 600 million PLN, will replace the existing facility, focusing on the production of small household appliances, including vacuum cleaners and coffee machines. The new factory, covering 73,000 m^2, is set to be completed in 2026. In addition to production and logistics areas, it will feature ergonomic workstations and eco-friendly solutions in line with the company's long-term strategy. The facility will provide over 1,000 jobs, strengthening the economy of the Podkarpacie region. BSH is one of the largest plastics processors in Poland, utilizing advanced injection molding technologies. The company operates six factories, logistics centers, and research facilities in Poland, employing over 7,000 people. For years, it has been intensively expanding its production in Rzeszów, introducing modern assembly lines for Bosch cordless vacuum cleaners, such as the Unlimited 10 model. The construction of the new plant is being carried out in collaboration with Panattoni, a developer known for its previous industrial projects in Poland. The investment in Rudna Wielka further strengthens Poland's position as a key player in the European home appliance industry and serves as an example of synergy between modern technologies and local economic development.

https://tworzywa.online/

Covestro focuses on ecological logistics in Poland

To make chemical transportation in Poland more efficient and environmentally friendly, leading polymer materials manufacturer Covestro has partnered with logistics specialist DB Cargo BTT. A key element of this partnership is the transportation of methyl diphenyl diisocyanate (MDI), a chemical raw material used in the production of polyurethanes, such as in thermal insulation for buildings or appliances like refrigerators. Hanno Bruemmer, Head of Supply Chain and Logistics EMLA at Covestro, emphasizes that to achieve the joint goal of climate neutrality by 2050, Covestro must consider the entire value chain. Reliable, efficient, and sustainable logistics for increasingly eco-friendly products are critical here, especially close cooperation with customers and transport companies to optimize the supply chain. This includes improving loading efficiency, choosing the best transport modes and routes, and using sustainable energy sources such as green energy or HVO fuels to replace fossil fuels. As part of the partnership, DB Cargo BTT has implemented a comprehensive transportation solution combining several sustainable strategies. The process begins with the transportation of chemicals from Covestro's German plants to a nearby rail terminal using trucks powered by HVO 100 biofuel. The goods are then transported by rail to a distribution center in Poland, reducing road congestion and significantly lowering emissions. The final stage of delivery to end customers in Poland is carried out by trucks also powered by HVO biofuel. This type of fuel is considered one of the most environmentally friendly alternatives to traditional diesel. With the use of this hybrid transport model, CO_2 emissions can be reduced by at least 70% compared to traditional road transport. Covestro and DB Cargo BTT demonstrate how an innovative approach to logistics can simultaneously support business growth and combat climate change. Introducing such solutions not only supports sustainable development but also represents an important step in aligning the chemical sector with the European Union's climate policy requirements.

https://tworzywa.online/

Dopak focuses on innovation in plastic recycling

Dopak, a leading supplier of solutions for the plastics processing industry in Poland, is introducing a new product segment to its offering. The company has partnered with the Spanish manufacturer Altero Recycling Machinery, which specializes in designing and producing advanced lines for the regranulation of plastic waste—both post-production and post-consumer. As a result of this partnership, Dopak has become the exclusive distributor of ALTERO machinery in the Polish market, offering full service—from sales of equipment to servicing and the supply of spare parts. ALTERO is a well-established brand in the recycling world, creating comprehensive and technologically advanced solutions. Their regranulation lines stand out for their high performance, reliability, and low energy consumption, which helps reduce operational costs and minimize environmental impact. ALTERO machines are designed to process a wide range of thermoplastic materials such as PP, PE, PS, ABS, PET, PVC, and PC. With the use of modern technologies, they ensure full control over process parameters, guaranteeing the stability and quality of the produced regranulate. Ilona Bazgan, Sales Director at Dopak, stated that they have observed increasing demand for high-quality regranulation lines in Poland—both among plastic processors and recyclers. ALTERO's solutions perfectly complement their offering, supporting clients in efficiently transforming waste into high-quality regranulate. This is an important step towards a circular economy. ALTERO offers four main series of regranulation lines: VELOX – lines adapted for recycling demanding post-consumer waste with high moisture and contamination content; DUPLO – specifically designed for processing heavily printed and wet waste; OPTIMA – compact solutions for waste generated in injection molding and extrusion processes; AQUA – modern technology dedicated to recycling PET and PA.

https://tworzywa.online/

Recycling fee for "tear-off's" in Biedronka

Since January 2025, the Biedronka store chain has introduced a recycling fee for lightweight plastic bags, commonly known as "tear-offs." This change is in accordance with the Packaging and Packaging Waste Act and European Union regulations aimed at reducing excessive use of single-use packaging. Very lightweight plastic bags, with a material thickness below 15 micrometers, remain free of charge if used according to their intended purpose – for packaging loose products such as fruits, vegetables, bread, candies, dried fruits, meat, or fish. However, the fee of 25 groszy per bag (0.20 PLN + VAT) applies when the bags are used for packaging products with their own packaging or non-food items. The funds collected from the recycling fee are allocated to the relevant regional offices. Similar measures have already been implemented in other retail chains, such as Auchan, E.Leclerc, and selected Carrefour stores, which introduced fees for lightweight plastic bags earlier. The regulations imposing the collection of fees are derived from EU legislation, which sets a minimum fee of 20 groszy per bag. The Trade Inspection monitors compliance with these regulations, and failure to charge the fees may result in fines ranging from 500 PLN to even 20,000 PLN. As part of its environmental initiatives, Biedronka encourages customers to use reusable solutions, such as "veggie bags" – mesh bags intended for packaging fruits and vegetables, available in stores for 2.99 PLN for a set of two. The introduction of recycling fees for plastic bags is part of a broader strategy to reduce the use of single-use materials in retail. According to European Commission data, the consumption of such packaging in EU member countries remains high, resulting in a significant environmental burden. These changes aim not only to reduce waste but also to educate consumers and encourage the use of more sustainable solutions. In Poland, the recycling fee for plastic bags has been in place since 2018, but its gradual extension to other categories of products reflects growing determination in the fight against waste from these materials.

https://tworzywa.online/

Coveris and Hadepol Flexo combine their packaging experience

Coveris, a leading international packaging manufacturer, will showcase its products for the first time at the ExpoSweet fair in Warsaw, which will take place from February 16-19, 2025. The company will present its offerings in collaboration with Hadepol Flexo, a recently acquired company known for its expertise in packaging for the bakery and confectionery sectors. This acquisition perfectly complements Coveris' portfolio, allowing them to expand their offerings for the confectionery and bakery industries. At the ExpoSweet fair, Coveris will present a wide range of packaging solutions, including wicket bread bags, flat-fold bags, stand-up pouches, thermoforming films, barrier packaging for sandwiches, paper packaging, and other packaging options for ready-to-eat products. These solutions are designed with sustainability in mind, offering benefits such as recyclability, product protection, and extended shelf life. Filip Gumowski, the Operations Director at Hadepol Flexo, emphasized that for local customers, the partnership with Coveris strengthens their ability to meet customer needs on a broader scale. Thanks to Coveris' strong presence in Europe and its industry-leading innovations in paper and plastic materials, Hadepol Flexo is better prepared than ever to respond to the changing demands of the market.

https://www.plastech.pl/

Orlen and Grupa Azoty finalize negotiations on acquisition of Grupa Azoty Polyolefins

Grupa Azoty and Orlen have signed an agreement on January 16, 2025, to continue their collaboration with the aim of establishing the conditions and principles for a po-

tential transaction. This would involve the acquisition by Orlen or another entity designated by Orlen of all or part of the shares in Grupa Azoty Polyolefins currently held by Grupa Azoty, or another form of investment. Both parties have agreed that negotiations regarding the acquisition conditions, along with the due diligence process, will take place within the planned timeline, concluding by March 31, 2025. This deadline may be extended or modified without altering the agreement. As indicated by Adam Leszkiewicz, the CEO of Grupa Azoty S.A., since December, intensive joint analyses of potential solutions regarding the future of Grupa Azoty Polyolefins have been ongoing. These analyses, based on the cooperation agreement and a previous Letter of Intent, have led to a clear direction of action: the sale of all or part of the shares in Polyolefins held by Grupa Azoty. At this stage, due diligence will begin, and the parties will work towards negotiating the terms of the potential transaction. Grupa Azoty is confident that this collaboration will bring mutual benefits. From their perspective, the potential transaction is an important element of the Recovery Program, under which a new business model will be developed. Negotiations will be conducted based on the agreement signed between Orlen S.A., Grupa Azoty S.A., Grupa Azoty Police S.A., and Grupa Azoty Polyolefins S.A.. This agreement is linked to the Cooperation and Stabilization Agreement signed on December 19, 2024, between the companies of the Azoty Group, Orlen S.A., Hyundai Engineering Co., LTD., and Korean Overseas Infrastructure & Urban Development Corporation.

Polish Chemistry Officially Inaugurates the Presidency

The chemical industry in Poland and Europe is facing increasing challenges. Data shows that the sold production of the chemical industry in the European Union has declined by over 14% in the last two years. Given that the chemical industry is a strategic sector for the security and competitiveness of the Polish economy, an interministerial meeting was organized at the initiative of the Ministry of Development and Technology and the Polish Chamber of Chemical Industry, during Poland's presidency of the EU Council. The event, held under the slogan "Presidency – Time to Start! Security = Competitiveness. Polish Chemistry in the PL Presidency," took place on January 27, 2025. It was attended by representatives of key ministries relevant to the industry, the Representation of the European Commission in Poland, and entrepreneurs associated with the Polish Chamber of Chemical Industry (PIPC). The meeting was held under the official patronage of the Polish presidency in the EU Council. Industry representatives pointed out that twenty years ago, Europe was the world's largest producer of chemicals, holding a 27% share of the global market. However, recent data indicates that Europe's share in global chemical production has now decreased to approximately 13%. In 2024, capacity utilization was 10% below pre-crisis levels (referring to the crisis from 2014–2019). In Europe, between 2023 and 2024, around 11 million tons of production capacity closures were announced—ten times the annual fluctuations of the past decade. These plant closures are destabilizing the European industry and local supply chains. In Poland, the chemical industry's sold production has recorded another year of decline. Between January and November 2024, it amounted to PLN 414.3 billion, marking a decrease of approximately PLN 30 billion compared to the same period in 2023. The deterioration in statistics is evident in both the production of chemicals and chemical products, as well as rubber and polymer-based products. The chemical industry is an integral part of the European and Polish industrial structure. According to the latest available data, the European chemical sector generates approximately EUR 655 billion in revenue and nearly EUR 165 billion in added value. Chemicals also play a key role in European innovation, as Europe ranks second globally in the number of patents filed for chemicals. In Poland, the chemical sector accounts for nearly one-fifth of the national industry and provides over 341,000 jobs, making it the third-largest sector in terms of employment. Chemicals are a fundamental building block of everyday life, used in most industrial products and supplying key sectors such as pharmaceuticals, microprocessors, battery materials, packaging, consumer electronics, and construction materials.

https://www.plastech.pl/

dr Agnieszka Szadkowska
mgr Mateusz Borkowski

WORLD NEWS

Covestro: a new chemical recycling process for elastomers

The German corporation Covestro, a leading global supplier of high-tech polymer materials, announces plans to build a pilot plant for elastomer recycling. The investment is set to be completed in 2025 and will be located in Leverkusen. The project marks an important step towards greater sustainability in the elastomer industry. The patented Vulkollan technology enables not only the recycling of more than 90% of decommissioned material mass fractions, such as forklift truck tires, but also reduces the carbon footprint by up to two-thirds compared to virgin material. The pilot plant and the associated commitment to proving the feasibility of elastomer recycling demonstrate the company's strong dedication to circular economy solutions and represent a significant milestone for its elastomer products. With the successful expansion of this new recycling process, Covestro addresses customer demand for end-of-life solutions and carbon footprint reduction while ensuring high-quality elastomer products. The emerging pilot plant serves as an invitation for players across the entire value chain to collaborate in developing a circular economy framework and a reverse value chain for end-of-life materials. Covestro's customers use Vulkollan® systems to mold parts for numerous applications that require high durability and performance. Typical uses for Vulkollan® components include forklift wheels, bumper elements in rail transport, as well as vibration control parts and impact buffers in automobiles. The outstanding quality of Vulkollan® enables more sustainable and economical operation in target applications by extending service life, increasing maintenance intervals, and reducing unplanned downtime. Due to the high efficiency of the recycling process, end-of-life Vulkollan® materials can be reintroduced into new impact buffers and forklift tires using the mass balance approach. The new chemical recycling process represents a breakthrough for the elastomer industry. Unlike mechanical recycling methods, this approach breaks down the end-of-life elastomer material into its chemical building blocks to obtain purified monomers that can be reused while maintaining known and proven quality standards.

The new chemical recycling process addresses the unique challenges posed by elastomer materials, which are considered highly resistant and durable. Downcycling is not an option for this high-performance application. This technology allows for the recycling of a large fraction of decommissioned material mass, thereby reducing the environmental impact of our elastomer production. The pilot plant will play a crucial role in refining the recycling process beyond the laboratory scale by testing it with various waste streams and different end-of-life materials. It will also serve as a platform for Covestro to engage with potential project partners and customers, paving the way for the development of a larger commercial recycling facility in the future.

https://www.chemiaibiznes.com.pl/

Spolana will discontinue production of PVC and caprolactam

The Czech producer of caprolactam and PVC, Spolana, a subsidiary of the Orlen Unipetrol Group, has announced a restructuring plan for its production facility in Neratovice on the Elbe River. The company, which currently employs around 700 people, emphasizes that the aim of these changes is to increase profitability and improve competitiveness in both domestic and international markets. By mid-2025, Spolana will discontinue the production of PVC and caprolactam. The restructuring plan also includes streamlining the organizational structure and reducing the workforce by 500 jobs. After the process is completed, approximately 150 employees will remain with the company to implement new projects related to industrial decarbonization. One of the key elements of Spolana's strategy will be the continued modernization of its sulfuric acid production plant, which was commissioned in 2023. The company will also maintain the operation of its wastewater treatment plant, which serves not only the facility itself but also nearby towns. Additionally, flood protection projects for Neratovice, carried out in cooperation with local authorities, will remain an important area of focus. Spolana's restructuring is a response to a series of challenges, including declining demand for caprolactam and other petrochemical products, as well as macroeconomic stagnation in the region. The situation is further exacerbated by increasing price pressure from producers in the U.S. and the Middle East, where production costs are lower. Spolana assures that employees affected by layoffs will receive comprehensive support. Severance packages exceeding the standards set in the collective agreement are planned.

https://tworzywa.online/

Recycled plastic soap

Scientists estimate that only a small percentage of plastics produced worldwide undergo recycling. The

main reasons for this are the high costs of the process and contamination issues, such as food residues or other substances, which complicate the reuse of materials. In response to these challenges, Professor of Chemistry Guoliang "Greg" Liu from Virginia Tech has developed an innovative method that transforms plastic waste into a component used in the production of soaps, among other applications. Liu and his team focused on polyethylene and polypropylene – two of the most commonly used polymers. Their technique enables the breakdown of these molecules under heat, extracting an oil with a composition similar to one of the key substances used in detergents. Professor Liu points out that this is a molecule we use every day, emphasizing the universal application of the resulting product. One of the biggest challenges facing the recycling industry is the lack of economic feasibility. Liu highlights the need to find new, practical applications for recycled materials that have widespread use in daily life. Detergent and cosmetic ingredients derived from recycling could significantly enhance the attractiveness of such technologies from an industrial perspective. An important aspect of this new method is its environmental friendliness. Unlike traditional chemical recycling processes, which often generate pollutant emissions, the technique developed by Liu's team has a significantly lower environmental impact, adding that the potential of this method is enormous. The team's research findings have been published in the prestigious journal Science. Currently, efforts are underway to find business partners among investors and representatives of the detergent industry who could help implement the technology on a larger scale and assess its commercial viability. The new plastic recycling method could play a crucial role in sustainable waste management. Transforming unusable materials into components of everyday products, such as soaps, is an example of an approach that demonstrates how plastics – when properly processed – can support the development of a circular economy.

https://tworzywa.online/

Additive manufacturer Greenchemicals takes over Polichem

The Italian producer of plastic additives, Greenchemicals, has announced the acquisition of a domestic competitor, Polichem. The transaction was finalized in November 2024, but financial details remain undisclosed.

The acquired company, Polichem, headquartered in Garlasco near Milan, has been in operation since 1989 and specializes in the production of innovative additives for technical plastics. Polichem's portfolio includes nucleating agents, release agents, modifiers, chain extenders for polyamides (PA) and PET, as well as high-performance stabilizers. Greenchemicals, based in Desio, Lombardy, specializes in the production of halogen-free flame retardants and additives for materials such as EPS, XPS, PP, PE, PUR, PA, and PET. The company also has a representative office in Warsaw. Greenchemicals' operations in the Polish market enable direct collaboration with local plastic industry enterprises, strengthening its competitiveness in Central and Eastern Europe. The company is also present in Switzerland, France, the Netherlands, Hungary, China, and the USA. In 2023, its revenue amounted to approximately 45 million euros. Greenchemicals CEO, Micaela Lorenzi, described the acquisition of Polichem as strategic. It will enable the company to achieve significant synergies, strengthen its position in the international plastic additives market, and expand its product offering tailored to customer needs, including styrenic plastics, polyolefins, and technical plastics. Additionally, the acquisition will allow Greenchemicals to focus on sustainable development within the plastics industry. Through the acquisition of Polichem, Greenchemicals will gain the opportunity to further expand its product portfolio, particularly in the area of high-performance additives, while increasing its emphasis on sustainability.

https://tworzywa.online/

Honda adopts bioplastic for motorcycle's bodywork and windshield

Honda has selected Durabio, a bio-based engineering plastic from Mitsubishi Chemical, for the colored bodywork and windshield of its X-ADV motorcycles, which debuted in Japan in December 2024. Based on isosorbide, Durabio combines most of the properties of polycarbonate (PC) and polymethyl-methacrylate (PMMA) while being made from a bio-origin raw material derived from starch. As well as providing the toughness and other features required for motorcycle bodywork parts, Durabio can be given a glossy, sophisticated look merely by adding colorants. The added value given by the ability to eliminate the conventional painting process was a major factor in the decision to adopt Durabio for this application, marking its first use for paintless bodywork for motorcycles. Further, Durabio has already won acclaim for its outstanding protection against headwinds when used in the windshields of Honda motorcycles. As well as its use in the X-ADV, it has been adopted for the bodywork and windshields of the Forza 750 and NC750X models already unveiled in Europe. Durabio exhibits outstanding toughness, scratch resistance, and color development properties and is being used in a range of fields, including automotive interior and exterior parts, components for optical and electronic devices, and other products used in everyday life.

https://www.plasticstoday.com/

Redefining display technology for automotive windshields

Head-up displays (HUDs) show useful information, such as speed and turn-by-turn directions, on the lower part of the windshield, where it can be seen without the

driver needing to take his or her eyes off the road. Automakers and their suppliers are looking for advanced solutions for next-generation HUDs to increase user experience and safety. German polymer materials manufacturer Covestro, US specialty materials company Eastman, and Scotland's Ceres Holographics, a provider of holographic optical elements for displays, have joined forces to redefine such displays. The partners signed a memorandum of understanding (MoU) to explore the commercial production of the cutting-edge Holographic In-Plan Transparent Display (HIPTD) – a laminated hologram technology that allows multiple head-up displays on a single windshield. The MoU builds on years of collaboration, leveraging each company's technologies to manufacture holographic-enabled transparent HUDs for the automotive market. It will facilitate investigating the steps needed to set up and establish the necessary facilities and manufacturing capacity, ensuring an efficient, market-ready supply chain to meet the planned production timelines of OEMs wishing to adopt the technology. The partnership aims to accelerate the commercialization of this HUD solution, with Eastman leveraging its relationships with automotive OEMs and Tier One suppliers. In 2024, Ceres and Eastman demonstrated the latest holographic transparent display HUDs to OEMs in Europe, the United States, and China. These HUDs featured multiple transparent displays within a single, fully laminated windshield, each measuring up to 400 by 300 mm (16 by 12 in.). Custom-designed holographic optical elements (HOEs) were incorporated into a single sheet of Bayfol HX cellulose triacetate (TAC)m film, laminated with Eastman's newly developed interlayer stack, achieving the industry's largest field of view. This achievement was enabled by combining Covestro's expertise in photopolymer films; Ceres' digital mastering and HoloFlekt roll-to-roll replication system, which produces finished films up to 1400-mm (4.6 ft) wide; and Eastman's solutions to encapsulate functional films into automotive-approved laminates.

https://www.plasticstoday.com/

Alpla to double plastic recycling capacity by 2030

Austrian packaging company Alpla has set a goal to double its plastics recycling capability to 700,000 metric tons per year by 2030.

The company also said its commitment to the circular economy is "paying off." It currently invests at least 50 million euros ($51.4 million) annnually in plastics recycling. In October 2024, that included its first PET recycling plant in South Africa. Alpla also operates mechanical recycling facilities in Germany, Mexico, Poland, Spain, Romania, Thailand and Mexico. Overall, Alpla's recycling division produces recycled high density polyethylene and PET at 13 plants in nine countries. Alpla reported its sales increased to 4.9 billion euros ($5 billion), up 4 percent in 2024 vs. 2023. Alpla linked its success in 2024 to strong growth in South America, Africa, and the Middle East. Demand in North and Central America also recovered CEO Philipp Lehner said in a statement. Alpla is also experiencing an "upward trend" in Europe, Lehner continued, noting that market conditions remain 'challenging'. "Increasing European Union regulation is creating a lot of work and weakening our international competitiveness," Lehner said. "This is compounded by high labor costs in some countries. We are countering this with increased efficiency, new products, and our leading role in recycling." In 2023, European plastics manufacturing and recycled plastics production fell for the first time. Compared with 2022, EU plastics production plunged 8.3 percent to a total of 54 million tonnes. The production of mechanically recycled post-consumer plastics decreased by 7.8 percent, to 7.1 million tonnes. By contrast, global plastics production rose by 3.4 percent, which means Europe's global market share has shrunk further, to 12 percent. Although Europe maintains a positive trade balance in value, it became a net importer of plastic resins and finished goods, with resin exports dropping 25.4 percent from 2020 to 2023. As virgin and recycled plastics production shifts eastward, Alpla announced it will open a new plant in Thailand in 2025, without offering more details. The company said the markets in the Asia-Pacific region offer "huge potential." Labor and energy costs are also cheaper in the region than in Europe. Across all its divisions, Alpla reached 200 plants and created 1,000 new jobs through new business areas, acquisitions and training programs. A total of 24,350 employees work at 200 locations in 46 countries, with 365 working as apprentices.

https://www.plasticsnews.com/

Sidel adds three high-speed aseptic complete lines at CR Beverage plants

CR Beverage, one of China's leading bottled water brands, has invested in three high-speed Sidel aseptic complete lines to meet the growing consumer demand for higher-quality, healthier, and more environmentally friendly packaging for teas, juices, and carbonated beverages. In addition to being a leading producer of bottled water in China, CR Beverage is committed to providing consumers with a wider selection of high-quality beverages across its product range and addressing the projected 4.6% compound annual growth rate for 2023–2027, as forecasted by Global Data. After more than eight years of collaboration between CR Beverage and Sidel in China, and following the successful installation of Sidel's innovative complete packaging solution for large-format bottled water production, CR Beverage has once again turned to Sidel to create a unique solution for its aseptic production lines. At CR Beverage's plants in Yixing and Chengdu, Sidel has installed three high-speed aseptic complete lines, including the Aseptic Combi Predis FMa for tea and plum juice and the Aseptic Combi Predis FMac for all high- and low-acid products, as well as carbonated beverages with bottle neck sizes of 28 mm and 38 mm. The line at the Chengdu plant is equipped

with four EvoDECO labelers and conveyors. The lines currently produce 54,000 bottles per hour (bph) for the 450 ml format and 27,000 bph for the 1-liter format. Sidel's Aseptic Combi Predis solution offers the simplest, fastest, and safest dry preform decontamination on the market, designed to ensure food safety, product integrity, and extended shelf life for sensitive products without the use of preservatives. The Aseptic Combi Predis system uses dry hydrogen peroxide mist to sterilize preforms before blow molding, reducing water, energy, and chemical consumption. This process ensures a sterile filling and sealing environment, contributing to both product safety and sustainability. In 2024, Sidel marked the fifth anniversary of both its local production of Aseptic Predis and the establishment of its aseptic laboratory at the Beijing facility, which boasts strong local processing capabilities and focuses on local supply chains and sustainability. Over the past five years, the Sidel Beijing plant has delivered more than twenty sets of innovative Aseptic Predis Combi equipment to customers across China and Asia. The three high-speed Aseptic Predis complete lines for CR Beverage were manufactured at the Sidel Beijing plant, achieving a 100% first-time positive aseptic validation rate.

https://www.plastech.pl/

New Line of PP Bowls

Genpack, a manufacturer of foodservice products, is launching a new two-piece bowl series for restaurants and takeout establishments. The Grab-a-Bowl containers, designed with convenient handles, offer enhanced usability and comfort for both dine-in and takeaway meals. Grab-a-Bowl is suitable for both hot and cold dishes, ensuring efficiency, reliability, and functionality. Its collapsible design allows for space-saving storage and easy transport. A transparent lid provides quick visibility of the contents, supports order accuracy, and helps maintain freshness, making it an ideal choice for convenience stores, value-added grocery stores, and restaurants. The Grab-a-Bowl containers are designed to provide exceptional ease of use and practicality for both operators and consumers. Durable, collapsible bowl line with easy-grip handles is optimally designed for hot and cold sides, soups, and entrées. Designed for durability and versatility, Grab-a-Bowl is microwave-safe and refrigerator-safe for meal prep. It is available in diverse sizes to meet the needs of restaurant operators.

https://eplastics.pl/

Husky Technologies wins 2024 Fedil innovation award for plate line automation project

Husky Technologies is the recipient of the 2024 Fedil Innovation Award in the Process category for its Plate Line Automation project. The Fedil Innovation Awards recognize projects that stand out for their innovation, originality, and relevance to the Luxembourg economy. Laurent Huberty, Husky's manufacturing technology team manager for hot runners, said the company is honored to receive the Fedil Innovation Award in the Process category. The award is a testament to the innovation and dedication of Husky Technology team to drive operational excellence. Plate Line Automation project is just the beginning, company is excited to expand the success of this cutting-edge solution to our global network of facilities. Plate Line Automation project is an Industry 4.0 initiative designed to enhance operational efficiency, product quality, and employee productivity by integrating advanced robotics and cutting-edge software into the manufacturing process. The project integrates three advanced technologies into a single automated system. These include a 5-tonne automated guided vehicle (AGV) for pallet delivery directly to milling centers, fully automated tool loading and unloading for deep-hole drilling, and digital twin technology and tool analysis software for real-time simulation and quality control. This holistic approach demonstrates how Industry 4.0 can transform manufacturing processes by combining robotics and cutting-edge software. The Plate Line Automation project reduces production times, improves precision, enhances safety, and frees operators from repetitive tasks. Husky plans to expand this successful initiative to other facilities around the world. According to Rinas Mohammed, Husky's director of global operations, industrialized tooling for EMEA, the holistic approach demonstrates the company's commitment to leveraging the full potential of Industry 4.0 and advancing automation. This project is a perfect example of how Husky is combining advanced robotics and digital technology to streamline processes by automating critical tasks. Husky has reduced production times, enhanced precision, improved safety, and freed operators from repetitive, manual tasks. Fedil, established in 1918, serves as a leading business federation that amplifies the voices of Luxembourg's industrials and entrepreneurs, fueling economic growth and development. Encompassing companies across various sectors, Fedil actively advocates for the business community, championing policies that foster innovation, sustainability, and global competitiveness. Headquartered in Bolton, ON, Husky Technologies has more than 35 locations worldwide. The company produces machines, molds, hot runners, auxiliaries, and integrated systems that are built and sold across nearly every continent, supporting customers in more than 140 countries.

https://www.plasticstoday.com/

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TECHNICAL NEWS

The groundbreaking yogurt cup from INEOS Styrolution

INEOS Styrolution has announced the completion of a project confirming the feasibility of using mechanically recycled polystyrene in the production of yogurt cups. This success was made possible through collaboration with multiple partners across the value chain, marking an important milestone in plastic recycling.

The mechanical recycling process of polystyrene involves several stages, such as sorting using advanced Near Infrared (NIR) technology and object recognition, hot washing, flake sorting, melt filtration, and granulation. A key component of the process is the proprietary "super clean process" technology developed by INEOS Styrolution, which has been registered as a new technology under EU regulation 2022/1616. This solution enables the production of food-grade recycled material—achieving a level of purity previously only attainable in PET bottle recycling. The recycled material has identical physical properties to conventionally produced polystyrene, allowing it to be fully utilized in closed-loop applications. Extensive quality control was carried out on both the material and the finished cups, as well as detailed analyses required by the European Food Safety Authority (EFSA) for assessing this new technology. Importantly, the environmental footprint of the recycled material is significantly smaller compared to traditionally produced materials. In spring 2024, consumer testing was conducted with prototype cups containing recycled polystyrene in collaboration with the German dairy industry leader Theo Müller Group. Hundreds of such cups were filled with yogurt and offered to volunteers in the INEOS cafeteria for evaluation. The results were promising, with 90% of testers stating they would buy the product, despite noticing visual differences compared to traditionally produced cups. They also mentioned that a cup in a color other than white would be acceptable. The yogurt cups made from recycled polystyrene will appear on the shelves of Lidl supermarkets at the beginning of this year.

https://tworzywa.online/

Ecological plasticizer straight from vegetable oil

Nareglax is an innovative plasticizer developed by Versalis, a subsidiary of Eni, and is an ester of azelaic acid (DOZ). What sets Nareglax apart is the unique origin of the azelaic acid, which is produced by Matrìca, a joint venture between Versalis and Novamont. The azelaic acid is derived from European vegetable oils using a cutting-edge, eco-friendly technology. Nareglax boasts high purity and contains 38% carbon from renewable sources, in compliance with the ASTM D 6866-22 standard. It is compatible with PVC, NBR, and CR, offering a sustainable alternative to plasticizers like di(2-ethylhexyl) sebacate (DOS) and di(2-ethylhexyl) adipate (DOA). Particularly well-suited for applications requiring resistance to low temperatures, Nareglax excels in cables, hoses, films, packaging, and other flexible materials. Additionally, Nareglax offers excellent resistance to atmospheric conditions and provides effective electrical insulation properties. Free from phthalates, it features low volatility and minimal migration, making it a safe choice for various applications. Matrìca, located in Porto Torres, Sardinia, utilizes an innovative process to convert vegetable oils into mono- and dicarboxylic acids and esters, achieving high-purity products. The technology, developed by Novamont, does not use ozone in the oxidative cleavage of oils, significantly reducing its environmental impact. The introduction of Nareglax to the market is a significant step toward sustainable development in the chemical industry, integrating agriculture with industry and promoting the production of high-performance bioproducts. This initiative enhances the competitiveness of the Italian chemical sector by offering eco-friendly solutions that meet the highest quality standards.

https://tworzywa.online/

Acme Mills Company unveils its Natura bio-based polylactic acid fabrics

Acme Mills Company has unveiled its new line of bio-based polylactic acid (PLA) fabrics to replace petroleum-based nonwovens like PET, PP, and Nylon. The textile specialists hope to reduce its environmental impact, whilst still ensuring high levels of quality and performance.

The Natura product line features a variety of PLA fabric types including spun bond nonwovens, needled felts, hydroentangled, and melt-blown textiles. The new introductions will benefit industries including automotive, food and beverage, filtration, furniture, healthcare, and packaging. Matt Utley, Chief of Strategy at Acme Mills Company said, that by offering a bio-based alternative to petroleum-based textiles, the company is empowering industries to make environmentally responsible choices without sacrificing performance. Utilizing renewable resources like corn starch and sugarcane, Natura fabrics are biodegradable under industrial composting conditions. As a result, the new product line can help reduce

greenhouse gas emissions and fossil fuel consumption compared to traditional plastics. Using PLA reduces greenhouse gas emissions by up to 75% compared to petroleum-based plastics, helping organizations meet critical sustainability targets. With a global manufacturing and supply chain network covering Europe and North America, Acme Mills Company can meet the growing demand for eco-friendly products via its Natura fabrics line. Natura fabrics line are environmentally friendly, they don't compromise on performance, various industries can utilize the innovative fabrics and have global reach. The new product line has been Generally Recognised As Safe (GRAS) by the Food and Drug Administration (FDA), allowing Natura materials to be used in food-safe applications like beverage filters, food packaging, and disposable cutlery. The company is also "exploring advanced composite materials" by combining Natura PLA fabrics with other bio-based fibres to improve strength, durability, and versatility levels.

https://interplasinsights.com/

Bio-based EPS Offers New Packaging Alternative

DGeo has partnered with Lifoam Industries LLC, a subsidiary of Altor Solutions Inc., to offer sustainable packaging solutions designed to store and move temperature-controlled goods safely and compliantly. Lifoam's BioEPS (formerly known as EVG) packaging provides an alternative to traditional expanded polystyrene (EPS), aka PS foam, that will degrade in a bio-reactive landfill without sacrificing convenience or performance. Traditional PS foam used in coolers or as an impact barrier is not biodegradable, taking hundreds of years to decompose. BioEPS packaging, however, uses a bio-based additive that allows the material to break down in a bio-reactive landfill by an average of 92% over four years without leaving behind microplastics. John Glaser, director, packaging development, DGeo said, that the tens of millions of traditional EPS foam products used annually are not sustainable and conflict with many green initiatives. Adding BioEPS packaging to our product portfolio allows us to provide an environmentally friendly replacement to traditional EPS that delivers the same quality and function for a comparable price. BioEPS packaging provides a drop-in replacement for any traditional EPS application for temperature control, impact protection, and void fill. BioEPS packaging can be recycled where EPS is accepted. EPS has been a mainstay in cold chain and protective packaging for many years due to its high performance in thermal and physical applications and proven to be a challenge to replace, even in the face of heightened scientific and cultural awareness around its environmental impact. By utilizing BioEPS packaging, companies and consumers c.an get all the benefits of traditional EPS with a better end-of-life story.

https://www.plasticstoday.com/

Haircare brand debuts in bottles made from coconuts

The technology-driven Consumer Electronics Show (CES) 2025 held in January of 2025 in Las Vegas seems an unusual venue to introduce a line of unique haircare products to North American consumers. Created by the Korea Advanced Institute of Science and Technology (KAIST) and introduced by the Polyphenol Factory, the Grabity line of products is designed to tackle hair loss, thinning, and weak strands. The collection includes hair-lifting shampoos, conditioner, and a styling mist — each designed to provide a visible, transformative boost to hair. Made with an innovative ingredient, the products are said to deliver an immediate 140% boost in hair volume; the effects can last up to 48 hours. What is more unusual is that the product's bottles are made from polyphenol-rich coconut husk fibers. It turns out that the use of coconut husks in sustainable packaging is more than a marketing gimmick. A paper published in July 2024 explored how coconut husks can be used as an eco-friendly packaging material. The research showed that these husks can be transformed into antimicrobial coatings, biodegradable composites, and even bioplastics, which likely ties directly into Grabity's bottles. Another paper, published in December 2024, investigated raw and treated coconut shell biomass for potential polymer composites. Additionally, coconut husks have proven to be valuable in the creation of polyphenol-enriched hydrogels, which are used in medical applications like wound dressings, thanks to their antimicrobial and absorption properties, as reported in another paper published last month. One company has commercialized the use of a super-absorbing coconut material for industrial applications called CocoAbsorb. The CES 2025 showing coincided with the news that the haircare line will sell on Amazon US in early 2025 to start the products' expansion into North America.

https://www.plasticstoday.com/

New lubrication-free plain bearings without PTFE developed by igus

What connects dental floss, skis, frying pans, and plain bearings? All of them are based on organic fluorine compounds, also known as PFAS. What makes them unique: PFAS are resistant to water, heat, and dirt. They help plain bearings achieve wear resistance and dry running without lubrication. However, since these chemicals can break down very slowly, they have a bad reputation. If they enter the environment, they can harm both humans and nature. For this reason, igus is developing plain bearing materials, such as the new iglidur JPF, which completely eliminate PFAS, including PTFE. In February 2023, the European Chemicals Agency (ECHA) published a proposal for a ban on at least 10,000 compounds referred to as PFAS. The European Commission is expected to make a decision in 2025. The regulation on PFAS would then enter into force in EU member states as early as 2026. This ban

would have far-reaching consequences for industry and the consumer sector. Many industrial companies, including igus, are already preparing for stricter PFAS regulations. Because of PFAS, particularly PTFE (which is part of PFAS), igus motion plastics feature low friction during dry operation, making lubrication unnecessary. igus invested in research and development of alternative materials at the very start of the pan-European discussion on the possible ban of PFAS. Thanks to developing and launching materials and blends, igus can respond quickly to changes and develop new solutions. As a result, iglidur JPF was created. The new iglidur JPF material was developed based on the well-known and market-validated iglidur J material, which, unlike its predecessor, does not contain PTFE. The plain bearing requires no lubrication, is wear-resistant, and exhibits similar tribological properties and low wear as iglidur J – this was confirmed in tests in the company's 4,000 m² research laboratory. Users who use iglidur J in their machines and devices now have a PTFE-free alternative of the same quality. igus is currently working on PTFE-free formulations for iglidur X and iglidur W300. Initial tests are very promising.

https://www.plastech.pl/

Biesterfeld and Celanese's joint portfolio is growing

International distributor Biesterfeld and leading engineering plastics manufacturer Celanese are once again expanding their strategic partnership. Starting in January 2025, many new product families will be added to their extensive joint portfolio. Among the new items in the distributor's portfolio are two families of Liquid Crystal Polymers (LCP) – Vectra and Zenite. These are highly crystalline, naturally flame-retardant, and thermotropic thermoplastic materials. Due to their exceptional dimensional stability and excellent resistance to high temperatures, these materials are ideal for the production of thin-walled components. Biesterfeld has also obtained distribution rights for Thermoplastic Styrene Block Copolymers (TPS), such as Sofprene and Laprene. These polymers combine elastomer-like properties with excellent processing characteristics of thermoplastics. The distributor already holds distribution rights for the Santoprene TPV and Hytrel TPC product families from Celanese, enabling it to offer customers an even wider selection of thermoplastic elastomers. Additionally, the PET portfolio will be expanded – in addition to the Rynite product family, Biesterfeld will gain distribution rights for materials under the Impet brand. Another addition to the joint portfolio is the GUR product family. These are ultra-high molecular weight polyethylene (UHMW-PE) polymers, which feature excellent wear resistance, exceptional impact strength, self-lubricating properties, and outstanding mechanical properties, even under cryogenic conditions. The expanded portfolio is completed by two families of Long-Fiber-Reinforced Thermoplastics (LFT) – Celstran and Compel. Long-fiber-reinforced thermoplastics stand out for their high rigidity and strength, making them ideal for replacing metal in demanding applications. All the new distribution rights, as well as the existing ones for the Celanex PBT, Celanyl PA, Crastin PBT, Ecomid Recycled PA, Frianyl PA, Frianyl PPA, Hytrel TPC, Rynite PET, Santoprene TPV, Selar PA, Zytel PA, and Zytel HTN product families, cover the entire EMEA region, including the UK and Nordic countries.

https://www.plastech.pl/

PA 6.6 from used cooking oil

Ascend Performance Materials has announced the production of acrylonitrile, hexamethylenediamine, adipic acid, and PA 6.6 using raw materials derived from used cooking oil. This initiative is part of the company's Bioserve portfolio and results in PA 6.6 with a 25% smaller carbon footprint compared to traditional PA 6.6 derived from fossil fuels. The company uses the ISCC Plus mass balance certified approach, enabling the industrial production of sustainable materials without compromising performance standards. All Ascend manufacturing facilities in the United States are ISCC Plus certified for processing biobased, circular, and biocircular materials. As Alex Mihut, Vice President of Specialty Chemicals at Ascend, states, the company aims to tackle the challenges faced by customers by delivering large-scale sustainable material solutions while maintaining performance and quality. In addition to sustainable materials, Ascend is actively working on reducing scope 1 and 2 emissions. Bioserve products are positioned as having some of the lowest carbon footprints for industrial-scale PA 6.6 and its precursors in the market. Chris Johnson, Senior Director of Sustainability at Ascend, highlighted the company's sustainability strategy, which includes a commitment to delivering solutions that meet customer needs and sustainability goals.

https://eplastics.pl/

ENGEL Introduces the Column-Free Victory Electric

ENGEL is expanding its renowned series of column-free victory injection molding machines with the introduction of the victory electric—an electric version that combines the benefits of column-free technology with modern servo-electric drives. The decision to integrate the existing e-motion TL model into the victory series marks a significant shift in ENGEL's portfolio, which now includes three versions of these machines: electric, hybrid, and hydraulic. The new machine is equipped with advanced drive components, significantly improving energy efficiency. Redesigned injection units offer higher injection speeds and greater user convenience. Enhanced accessibility to key components, such as the plasticizing cylinder, simplifies maintenance and improves service efficiency. These upgrades translate into higher performance, energy savings, and increased machine avail-

ability. One of the innovations of the victory electric is the integration of hydraulics for clamping forces starting at 80 tons, allowing it to support molds that require hydraulic assistance. The machine is available with clamping forces ranging from 30 to 130 tons, making it a versatile solution for industries demanding high precision, flexibility, and short cycle times. It is particularly suited for sectors producing large volumes of precision components, such as medical technology, automotive, electronics, and technical molding. With this machine, ENGEL aims to strengthen its leadership in these fields. The victory electric ensures exceptional injection process accuracy in two key aspects. First, the electric injection units enable precise control of each injection cycle, resulting in outstanding part quality and an extremely low scrap rate. This is a crucial advantage in the production of high-value components, where minimizing material waste is a top priority. The electric drive also allows for ultra-fast response times, supporting record-breaking production cycles while maintaining high quality. The second aspect of precision is the uniform distribution of clamping force across all mold cavities. This is particularly important in multi-cavity mold production, where perfect platen parallelism is essential. As a result, molds experience less wear, reducing maintenance costs. The large, open mold space—one of the defining features of column-free machines—greatly simplifies mold changes and accelerates maintenance, enhancing machine availability and lowering production costs. This design also enables the use of large and complex molds without the need for a machine with significantly higher clamping force. With its compact footprint and small space requirements, the victory electric is an ideal solution for facilities with limited space, as well as for cleanroom applications. Its fully enclosed toggle system minimizes the risk of oil leaks and contamination. The absence of columns also reduces air turbulence, limiting the risk of dust and particle accumulation in the mold area. Combined with an optional cleanroom package qualifying it for ISO 7 standards, ENGEL is setting new benchmarks for cleanliness. Low emissions and enclosed construction elements make the victory electric a perfect choice for industries requiring the highest hygiene standards, such as medical technology.

https://tworzywa.online/

Recycled food-grade plastics

One of the major issues in the plastics industry is the use of recycled plastic in food contact packaging. This primarily concerns the safety of this material for use with food, meaning if it's fit to come into direct or indirect contact with foods using functional barriers. Another concern is the large volume of plastic waste from the packaging industry in general and food packaging specifically. Addressing this waste stream will promote recycling and sustainability. Now that the Commission Regulation (EU) 2022/1616 on recycled plastic materials and other items that can come into contact with foods is in force, the volume of recycled food-grade plastics is expected to increase. One of the regulation's key points is suitable recycling technologies and novel technologies. The former refers to post-consumer mechanical PET recycling and recycling from product loops in a closed and controlled chain. The aim is to increase and standardise the different technologies authorised in Commission Regulation (EU) 282/2008, facilitating new individual authorisations based on what has already been authorised. The industry's biggest challenge is developing new technologies that can be used to manufacture plastics for safe contact with food. This can be anything that isn't yet considered suitable, such as mechanical recycling of any material other than PET, chemical recycling of any polymer, physical recycling (using solvents) and functional barriers. The latter are no longer safe under the new regulation and require authorisation to be placed on the market. Today, recycled plastic can only be introduced in direct contact with products made of PET or through closed and controlled loops. Bottles, trays and other products with up to 100% recycled PET content are available on the market. However, the volume of recycled PET currently available is too low to cover all the industry's needs. This is why this technology is suitable under the current regulations. Recycled materials other than PET are often found in contact with food, such as polyolefins (mainly HDPE and PP) from closed and controlled loops. Products with recycled polyolefins include fruit and vegetable crates and food drums. These would require authorisation from the European Food Safety Authority (EFSA) under the previous regulation but are allowed under the current one. Several novel technologies have been submitted to EFSA. Some are functional barrier processes for PET and polystyrene (PS), where the effectiveness of the barrier layers must be ensured by migration tests and assessments of homogeneity over time and in the results. Polyolefin decontamination technologies have also been submitted to EFSA to validate an efficient decontamination technology for these materials, as well as physical recycling processes by dissolution of PS. AIMPLAS works with different companies and its developments in assorted studies to decontaminate these materials through challenge tests. It also provides advice to companies collaborating on the reports required to obtain EFSA authorisation for functional barrier structures in PET and decontamination of different polymers.

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WYNALAZKI / INVENTIONS

Sposób otrzymywania termoutwardzalnej żywicy fenolowo-furfuralowo-formaldehydowej – Marta Depta, Katarzyna Zielińska, Sławomir Napiórkowski, Bogusław Tkacz, Jerzy Jasienkiewicz, Zofia Hordyjewicz-Baran, Ewa Zajszły-Turko, Katarzyna Jaszcz (Zgłoszenie Nr 444962, Sieć Badawcza Łukasiewicz – Instytut Ciężkiej Syntezy Organicznej „Blachownia", Kędzierzyn-Koźle; Politechnika Śląska, Gliwice)

Przedmiotem zgłoszenia jest sposób otrzymywania termoutwardzalnej żywicy fenolowo-furfuralowo-formaldehydowej, który obejmuje dwustopniową kondensację alkilofenolu z furfuralem, a dalej z formaldehydem, prowadzoną w środowisku alkalicznym w obecności wodorotlenku metalu alkalicznego. Polega na tym, że po kondensacji żywicę poddaje się eteryfikacji alkoholem jednowodorotlenowym, który zawiera 4–8 atomów węgla w cząsteczce z użyciem jako katalizatora kwasu malonowego albo szczawiowego tak, że pH układu reakcyjnego wynosi maksymalnie 4. W pierwszej kolejności prowadzi się kondensację alkilofenolu z furfuralem, w stosunku molowym 1:0,5-0,8 w temp. 115–130°C, przez 10–12 h, po czym do układu wprowadza się formaldehyd w ilości 0,5–0,8 mola na jeden mol alkilofenolu i prowadzi się reakcję w temp. 80–90°C przez 1–3 h. Do tak otrzymanej żywicy wprowadza się alkohol, w ilości 6–12 moli w przeliczeniu na 1 mol alkilofenolu i po ogrzaniu do temp.110°C prowadzi się eteryfikację wobec 0,002 do 0,15 mola katalizatora na 1 mol związku alkilofenolowego, z wykorzystaniem destylacji azeotropowej, do całkowitego usunięcia wody (wg Biul. Urz. Pat. 2024, nr 48, 9).

Sposób otrzymywania estru kwasu tereftalowego i alkoholu alifatycznego C9 z odpadowego poli(tereftalanu etylenu) – Marcin Muszyński, Agata Krasuska, Nowicki Janusz, Maria Bartoszewicz, Ewa Nowakowska-Bogdan, Janusz Waćkowski, Gabriela Dudek (Zgłoszenie nr 444963, Sieć Badawcza Łukasiewicz – Instytut Ciężkiej Syntezy Organicznej „Blachownia", Kędzierzyn-Koźle, Politechnika Śląska, Gliwice)

Zgłoszenie dotyczy sposobu otrzymywania estru kwasu tereftalowego i nasyconego alkoholu alifatycznego C9 z odpadowego poli(tereftalanu etylenu), polegającego na tym, że mieszaninę odpadowego poli(tereftalanu etylenu) i alifatycznego alkoholu C9, poddaje się transestryfikacji wobec katalizatora w postaci cynoorganicznego kwasu Lewisa z grupy obejmującej butylo tris(2-etyloheksanian) cyny, bis(2-etyloheksanian)cyny, tlenek monobutylocyny, tlenek dibutylocyny oraz tlenek dioktylocyny. Udział katalizatora wynosi 0,1–10% mas. w odniesieniu do masy poli(tereftalanu etylenu), a stosunek masowy alkoholu do poli(tereftalanu etylenu) wynosi od 1,2:1 do 8:1. Reakcję prowadzi się w reaktorze okresowym w temp. 120–280°C w czasie 1–10 h, pod ciśnieniem 500–1000 mBar. Powstający w procesie glikol etylenowy, w sposób ciągły, jest usuwany ze środowiska reakcji przez destylację. Uzyskaną mieszaninę poreakcyjną przesącza się, po czym przemywa wodnym roztworem wodorotlenku sodu, potasu albo amonu, o stężeniu 1–15% mas., w ilości 1–50% mas., w odniesieniu do masy przesączonej mieszaniny poreakcyjnej, a następnie przemywa się wodą destylowaną. Otrzymuje się surowy produkt, który w tej postaci może być stosowany jako plastyfikator (wg Biul. Urz. Pat. 2024, nr 48, 10).

Hybrydowe środki biobójcze – Irena Grzywa-Niksińska, Małgorzata Machałowska (Zgłoszenie nr 445010, Sieć Badawcza Łukasiewicz – Instytut Chemii Przemysłowej imienia Profesora Ignacego Mościckiego, Warszawa)

Wynalazek dotyczy hybrydowego środka biobójczego, charakteryzującego się tym, że jako substancje aktywne zawiera ekstrakt z kapusty oraz ciecz jonową z grupy czwartorzędowych soli amoniowych, zmieszane w stosunku procentowym od 0,1–99,9% do 99,9–0,1%, który może być przeznaczony do zabezpieczania rodzaju materiałów narażonych na działanie szkodliwych drobnoustrojów (wg Biul. Urz. Pat. 2024, nr 49, 6).

Sposób otrzymywania modyfikowanych aerożeli krzemionkowych oraz modyfikator aerożeli krzemionkowych – Sebastian Firlik, Izabella Legocka, Katarzyna Bieniek (Zgłoszenie nr 444411, Sieć Badawcza Łukasiewicz – Instytut Chemii Przemysłowej imienia Profesora Ignacego Mościckiego, Warszawa)

Przedmiotem zgłoszenia jest sposób otrzymywania modyfikowanych aerożeli krzemionkowych metodą zol-żel, z wodnej mieszaniny reakcyjnej zawierającej tetraalkoksysilan, w którym grupa alkoksylowa zawiera C1–C4 atomów węgla, alkohol alifatyczny C1–C4, kwas nieorganiczny oraz związek amonowy. Otrzymany żel poddaje procesowi starzenia, przemywania rozpuszczalnikiem organicznym, następnie działa czynnikiem hydrofobizującym i suszy. Charakteryzuje się tym, że na etapie otrzymywania zolu jako związek modyfikujący stosuje się poliol w ilości 0,01–50% mas. w przeliczeniu na krzemionkę zawartą w tetraalkoksysilanie. Wynalazkiem jest również modyfikator aerożeli krzemionkowych, otrzymywanych metodą zol-żel, którym jest poliol, dodawany do mieszaniny reakcyjnej na etapie otrzymywania zolu (wg Biul. Urz. Pat. 2024, nr 49, 25).

Ceramiczny materiał kompozytowy wzmacniany włóknami tlenku glinu z powłoką PVD oraz sposób

jego wytwarzania – Grzegorz Reszka (Zgłoszenie nr 444637, JG GROUP Sp. z o.o., Lublin)

Przedmiotem wynalazku jest kompozyt wzmacniany włóknami tlenku glinu z powłoką PVD, charakteryzujący się tym, że zawiera proszek tlenku glinu α-Al_2O_3 o uziarnieniu 5–500 nm w ilości 40–90% objętościowych oraz zdyspergowane włókna tlenku glinu o średnicy 10–5 μm i długości 10–200 μm w takiej ilości, aby ich udział objętościowy w kompozycie wynosił 10– 60%. Przedmiotem zgłoszenia jest także sposób wytwarzania kompozytu wzmacnianego włóknami tlenku glinu z powłoką PVD na drodze spiekania (wg Biul. Urz. Pat. 2024, nr 49, 26).

Bezhalogenowa, samogasnąca pianka poliuretanowo-poliizocyjanurowa o poprawionych właściwościach użytkowych i sposób jej otrzymywania – Piotr Jankowski, Ewa Górecka, Weronika Pietruszka, Katarzyna Bieniek, Izabella Legocka, Irena Grzywa-Niksińska, Barbara Szczepaniak (Zgłoszenie nr 445005, Sieć Badawcza Łukasiewicz – Instytut Chemii Przemysłowej imienia Profesora Ignacego Mościckiego, Warszawa)

Wynalazek dotyczy sposobu otrzymywania pianki poliuretanowo-poliizocyjanurowej, który prowadzi się etapowo, wprowadzając składniki w odpowiedniej kolejności i każdorazowo intensywnie je mieszając do uzyskania homogenicznej dyspersji. Polega na tym. Że do mieszaniny zawierającej 27–30% mas. poliolu, 0,15–0,18% mas. katalizatora startu, 0,70–0,75% mas. katalizatora trimeryzacji, 0,80– 0,90% mas. silikonu i 0,20–0,25% mas. wody dodaje się kolejno: 2–10% mas. antypirenu, 0,2–2,0% mas. dodatku poprawiającego właściwości termoizolacyjne, 0,5–2,0% mas. dodatku biobójczego, 4,0–4,5% mas. pentanu, 55–60% mas. izocyjanianu. Wynalazkiem jest także pianka poliuretanowo-poliizocyjanurowa stanowiąca produkt otrzymany w katalizowanej reakcji 27–30% mas. poliolu z 55–60% mas. izocyjanianu, 4,0–4,5% mas. pentanu, 0,20–0,25% mas. wody oraz 0,80–0,90% mas. silikonu, 2–10% mas. antypirenu, 0,2–2,0% mas. dodatku poprawiającego właściwości termoizolacyjne, 0,5–2,0% mas. dodatku biobójczego, prowadzonej powyżej opisanym sposobem (wg Biul. Urz. Pat. 2024, nr 49, 29).

Sposób wytwarzania biopoliolu z nanocząstkami srebra – Elżbieta Malewska, Maria Kurańska, Aleksander Prociak, Jolanta Pulit-Prociak, Tomasz Prociak, Marcin Banach (Zgłoszenie nr 444023, Politechnika Krakowska)

Sposób wytwarzania biopoliolu z nanocząstkami srebra obejmujący transestryfikację oleju roślinnego w obecności katalizatora, gdzie czynnikiem transestryfikującym jest glikol dietylenowy DEG obejmującym dwa etapy. Na pierwszym etapie sporządza się macerat z owoców wiśni w DEG, po czym oddziela się stałą pozostałość od maceratu, który miesza się w stosunku objętościowym 9:1 z roztworem $AgNO_3$ w DEG, o stężeniu $5{,}15 \cdot 10^{-4}$ mol/L do $5{,}15 \cdot 10^{-3}$ mol/L. Następnie roztworem NaOH w DEG o stężeniu 0,01–1 mol/L ustala się pH w zakresie 7–12 i nie zmieniając warunków prowadzi się reakcję do uzyskania zmiany koloru roztworu na ciemnobrązowy. Na drugim etapie, zawiesinę nanosrebra w DEG o stężeniu 50–500 mg/kg i olej z pestek wiśni ogrzewa się w obecności katalizatora, przy czym stosunek molowy oleju do zawiesiny nanosrebra w DEG wynosi od 1:3 i nie zmieniając temperatury prowadzi się reakcję transestryfikacji przez 1–4 h. Przerywa się ogrzewanie, a mieszaninę reakcyjną pozostawia się ciągle mieszając do uzyskania temperatury pokojowej (wg Biul. Urz. Pat. 2024, nr 49, 29).

Sposób wytwarzania sztywnej pianki poliuretanowej z nanocząstkami srebra – Elżbieta Malewska, Maria Kurańska, Aleksander Prociak, Tomasz Prociak, Jolanta Pulit-Prociak, Marcin Banach (Zgłoszenie nr 447699, Politechnika Krakowska)

Zgłoszenia dotyczy sposobu wytwarzania sztywnej pianki poliuretanowej z nanocząstkami srebra, obejmujący przygotowanie przedmieszki poliolowej z biopoliolu z nanocząstkami srebra, katalizatorów, żelowania i aminowego, środka powierzchniowo czynnego, otwieracza komórek, antypirenu i wody. Biopoliol otrzymuje się dwuetapowo w wyniku katalitycznej transestryfikacji oleju roślinnego, gdzie czynnikiem transestryfikującym jest glikol dietylenowy DEG. Tak otrzymaną przedmieszkę poliolową miesza się z komponentem izocyjanianowym, wylewa do formy i sezonuje po wyrośnięciu, nie krócej niż 24 h (wg Biul. Urz. Pat. 2024, nr 49, 30).

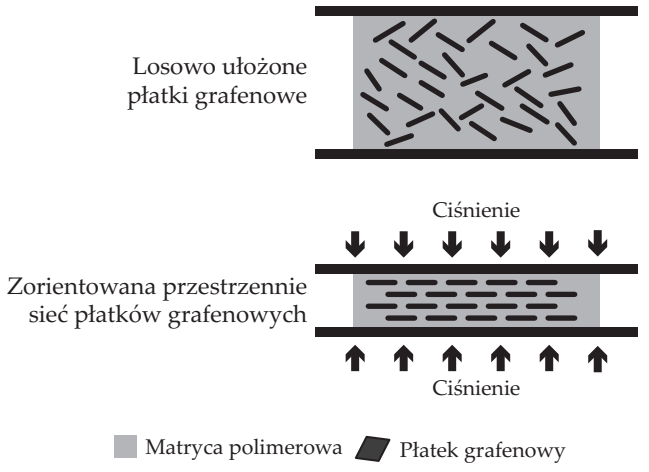
Sposób wytwarzania pianki poliuretanowej PUR – Leszek Kowaliński, Ryszard Treichel (Zgłoszenie nr 445085, Pionier Pianki Sp. z o.o., Baranów)

Przedmiotem wynalazku jest sposób wytwarzania pianki poliuretanowej PUR, mającej zastosowanie w szczególności w branży meblarskiej charakteryzujący się tym, że w procesie produkcji do głowicy spieniającej jednocześnie dozuje się składniki recepturowe produkowanej pianki, które to składniki następnie miesza się w głowicy spieniającej i dalej wylewa na transporter produkcyjny, wyłożony przesuwającym się papierem. Piankę PUR wytwarza się z użyciem toluendiizocyjanianu TDI, który stanowi mieszaninę toluendiizocyjanianu produkowanego z ropy naftowej i toluendiizocyjanianu produkowanego ze zużytych olejów roślinnych pochodzących z recyklingu, gdzie zawartość toluendiizocyjanianu produkowanego ze zużytych olejów roślinnych zawiera się w przedziale 40–100% wymaganej w procesie całkowitej ilości niezbędnego toluendiizocyjanianu (korzystnie 70%). Poszczególne frakcje toluendiizocyjanianu przed rozpoczęciem dozowania schładza się do temp. 18–23°C (korzystnie 21°C), po czym poszczególne składniki odpowietrza się i dalej komponenty te dozuje się do głowicy przy pomocy pomp o regulowanej wydajności z osobnych zbiorników magazynowych i przy pomocy niezależnie działających układów pompowych (korzystnie z wymiennikami ciepła), a następnie w głowicy

spieniającej poszczególne składniki miesza się, przy czym wykorzystywaną w procesie wodę będącą czynnikiem porotwórczym, przed rozpoczęciem procesu dozowania zmiękcza się i pozbawia metali (korzystnie w procesie odwróconej osmozy). Tak uzyskaną mieszaninę wylewa się na przesuwający się papier, gdzie zaczynają się reakcje chemiczne, które przejawiają się jako wzrost reagującej masy, a wzrastającą masę spienianej pianki PUR dalej przemieszcza się w sposób ciągły przez system transporterów produkcyjnych do krajarki, która odcina wyprodukowaną piankę. Następnie transportuje się ją na regaty w sezonowni półkowej, gdzie następuje jej dojrzewanie bloków. Bloki po zakończonym procesie sezonowania przekazuje się do magazynu bloków długich i/albo wytworzoną piankę tnie się na bloki krótkie, które transportuje się do magazynów, gdzie dalej rozkrawa się je na płyty, kształtki i formatki (wg Biul. Urz. Pat. 2024, nr 49, 30).

Materiał kompozytowy na bazie grafenu wykazujący kierunkowe przewodnictwo cieplne oraz sposób jego wytwarzania – Mariusz Zdrojek, Karolina Filak-Mędoń, Klaudia Żerańska (Zgłoszenie nr 444199, Politechnika Warszawska)

Zgłoszenia dotyczy materiału kompozytowego na bazie grafenu, przeznaczonego do stosowania jako materiał przewodzący ciepło w sposób kierunkowy o współczynniku anizotropii większym niż 1, charakteryzujący się tym, że zawiera matrycę polimerową w zakresie 87,5–99,5% mas. oraz nanowypełniacz w postaci płatków grafenowych w zakresie 0,5–12,5% mas. w odniesieniu do całkowitej masy kompozytu oraz sposób wytwarzania tego materiału kompozytowego (wg Biul. Urz. Pat. 2024, nr 49, 30).



Sposób otrzymywania powłoki ochronnej na powierzchni elastycznego kompozytu z proszkiem magnetycznym – Joanna Mystkowska, Anna Powojska, Arkadiusz Mystkowski (Zgłoszenie nr 445106, Politechnika Białostocka)

Przedmiotem zgłoszenia jest sposób otrzymywania powłoki ochronnej na powierzchni elastycznego kompozytu z proszkiem magnetycznym, którego osnowę stanowi syntetyczny polimer krzemoorganiczny o strukturze silosów, polegający na tym, że przygotowuje się roztwór polikaprolaktonu w chloroformie, po czym dodaje się do niego materiał osnowy kompozytu. Otrzymany roztwór do powlekania poddaje się homogenizacji, a następnie nanosi się go na powierzchnię kompozytu za pomocą metody do powlekania, po czym kompozyt pokryty powłoką poddaje się suszeniu (wg Biul. Urz. Pat. 2024, nr 49, 31).

Sposób modyfikacji polimerów krzemoorganicznych, zwłaszcza polidimetylosiloksanów i opatrunek w postaci elastycznej folii – Małgorzata Szymiczek, Sara Sarraj (Zgłoszenie nr 448935, Politechnika Śląska, Gliwice)

Sposób modyfikacji polimerów krzemoorganicznych, zwłaszcza polidimetylosiloksanów, suszonym ziołem, charakteryzujący się tym, że napełniacz w postaci tymianku suszy się w temp. od 20–25°C (korzystnie 22°C) w czasie 18–24 h (korzystnie 20 h), rozdrabnia na młynku czteronożowym w czasie 2–4 minut (korzystnie 3 minuty), albo aż do osiągniecia wielkości ziarna nie większej niż 500 μm (korzystnie 400 μm) i przesiewa przez sita o wielkości oczka nie większej niż 100 μm (korzystnie 80 μm). Tak przygotowany napełniacz miesza się z bazą silikonową w proporcji 0,1:10–1:10 masowo tymianek w stosunku do całego systemu polimerowego, w którym proporcja bazy silikonowej do katalizatora wynosi 1:1 masowo w mieszadle obrotowym w czasie 2,5–3 minut (korzystnie 3 minuty), jednocześnie stosując chłodzenie podczas mieszania, utrzymując temp. 20–40°C (korzystnie 23°C). Następnie do mieszanki dodaje się katalizator platyny i tak otrzymany produkt odpowietrza się w suszarce próżniowej w czasie 4–5 minut (korzystnie 5 minut), po czym odlewa grawitacyjnie do form i poddaje się procesowi kondycjonowania, korzystnie w temperaturze 30–70°C (najkorzystniej 60°C) w czasie 30–120 minut (korzystnie 60 minut), a następnie kondycjonuje w temp. 50–90°C (korzystnie 80°C) w czasie 60–180 minut (korzystnie 120 minut). Przedmiotem zgłoszenia jest też opatrunek w postaci elastycznej folii charakteryzujący się tym, że ma grubość nie większą niż 4 mm i zawiera tymianek o zawartości 2,5%, 5%, 7,5% i 10% masowo, a resztę stanowi polidimetylosiloksan (wg Biul. Urz. Pat. 2024, nr 49, 31).

Biodegradowalny kompozyt na bazie spienionej biomasy pochodzenia roślinnego, ewentualnie o właściwościach higienizujących – Irena Grzywa-Niksińska, Małgorzata Machałowska, Izabella Legocka (Zgłoszenie nr 445006, Sieć Badawcza Łukasiewicz – Instytut Chemii Przemysłowej imienia Profesora Ignacego Mościckiego, Warszawa)

Zgłoszenia dotyczy biodegradowalnego kompozytu na bazie spienionej biomasy pochodzenia roślinnego, ewentualnie o właściwościach higienizujących, zawierającego co najmniej 50 cz. mas. biomasy w postaci produktów, odpadów, pozostałości z produkcji rolnej pochodzenia roślinnego, zwłaszcza obierek i/lub odpadów z warzyw i/

lub owoców lub makulaturę oraz maksymalnie 50 cz. mas. modyfikatorów i otrzymanego przy użyciu promieniowania mikrofalowego. Biodegradowalne materiały według wynalazku stanowią miękkie lub twarde kompozyty roślinne, opcjonalnie o właściwościach higienizujących, które mogą być stosowane w produkcji opakowań chroniących transportowane produkty spożywcze lub niespożywcze lub jako materiał izolacyjny (wg Biul. Urz. Pat. 2024, nr 49, 31).

Sposób otrzymywania alkalicznych roztworów oligo(eter)oli – Andrzej Milewski, Michał Rabiej, Łukasz Czapura, Jakub Ćwiertnia (Zgłoszenie Nr 445167, Politechnika Śląska, Gliwice)

Przedmiotem zgłoszenia jest sposób otrzymywania alkalicznych roztworów oligo(eter)oli, polegający na tym, że 1 cz. mas. zasady rozpuszcza się w 0,4–06 cz. mas. wody zdejonizowanej i ogrzewa w temp. 60–95°C (korzystnie 90°C) intensywnie mieszając do całkowitego rozpuszczenia zasady. Następnie wprowadza 1–3 cz. mas. oligo-(eter) olu względem zasady, przy zachowaniu niezmiennej temperatury roztworu i schładza do temp. 20–25°C (korzystnie 20°C) (wg Biul. Urz. Pat. 2024, nr 50, 12).

Kompozyt o aktywności biobójczej oraz sposób jego wytwarzania – Paweł Głuchowski, Mariusz Stefański, Robert Tomala, Natalia Bartczak, Wiesław Stręk (Zgłoszenie Nr 445167, Instytut Niskich Temperatur i Badań Strukturalnych Polskiej Akademii Nauk, Wrocław)

Przedmiotem wynalazku jest kompozyt o aktywności biobójczej do wytwarzania powłok ochronnych zawierający grafen i kompozycję tworzącą powłokę malarską, charakteryzujący się tym, że ilość grafenu zawiera się w zakresie 0,05–35% mas.(korzystnie 0,1–30% mas.) w odniesieniu do całkowitej masy kompozytu, przy czym grafen ma postać wybraną z grupy obejmującej: płatki grafenowe, płatki tlenku grafenu i płatki zredukowanego grafenu i ich mieszaniny. Kolejnym przedmiotem wynalazku jest sposób wytwarzania kompozytu, według wynalazku charakteryzujący się tym, że do kompozycji tworzącej powłokę malarską wybranej spośród: farby, lakieru i emalii wprowadza się grafen w ilości zawierającej się w zakresie 0,05–35% mas. (korzystnie 0,1–30% mas.) w postaci wybranej z grupy obejmującej: płatki grafenu, płatki tlenku grafenu, płatki zredukowanego grafenu i ich kombinacje. Następnie wytworzoną mieszaninę poddaje się mieszaniu przy obrotach zawierających się w zakresie 400–1000 obr./min przez czas potrzebny do uzyskania jednorodnego kompozytu, korzystnie przez 25–35 minut (wg Biul. Urz. Pat. 2024, nr 50, 14).

Sposób wytwarzania hybrydowych nanostruktur na bazie disiarczków i nośników węglowych – Zuzanna Bajarska, Łukasz Makowski, Marta Mazurkiewicz-Pawlicka, Łukasz Werner, Michał Wojtalik (Zgłoszenie Nr 448790, Politechnika Warszawska)

Wynalazek dotyczy sposobu wytwarzania hybrydowych nanostruktur na bazie disiarczków i nośników węglowych przy użyciu reaktora zderzeniowego obejmującego etapy: przygotowania zawiesiny mieszaniny prekursora metalu i katalizatora o stosunku molowym Mo:katalizator=1:2 oraz Re:katalizator=1:5, które następnie poddaje się mieszaniu w celu uzyskania klarownego roztworu, po czym do wytworzonej zawiesiny dodaje się nośnik węglowy i poddaje się procesowi sonikacji (przez 30 min, min. moc 120 W) aż do uzyskania zdyspergowanej zawiesiny, przygotowania prekursora siarki o stosunku molowym Mo:S=1:2 oraz Re:S=1:2, dozowania do reaktora zderzeniowego za pomocą pompy strzykawkowej zdyspergowanej zawiesiny otrzymanej w etapie a) oraz roztworu prekursora siarki otrzymanego w etapie b) z szybkością przepływu wynoszącą 20-40 ml/min w temperaturze 15–25°C, oczyszczania wytworzonego produktu z etapu c) w formie zawiesiny sposobami filtracyjnymi lub odśrodkowymi i wygrzewania w przepływie gazu obojętnego w temperaturze 550-850°C w czasie 1 h (wg Biul. Urz. Pat. 2024, nr 51, 15).

Sposób wytwarzania paliwa z biomasy w mieszaninie z polimerem termoplastycznym pochodzącym z recyklingu – Adam Gnatowski, Renata Gnatowska, Rafał Kobyłecki, Robert Zarzycki (Zgłoszenie Nr 448705, Politechnika Częstochowska)

Przedmiotem wynalazku jest sposób wytwarzania paliwa z biomasy w formie sypkiej pochodzenia rolnego, w mieszaninie z polimerem pochodzącym z recyklingu, przeznaczonego do spalania w kotłach fluidalnych. Sposób otrzymywania paliwa z osnową polimerową charakteryzujący się tym. że obejmuje etapy: biomasę suszy się w temperaturze poniżej 105°C do zawartości wilgoci do 5% i przesiewa; miesza się napełniacz w postaci biomasy w formie sypkiej oraz osnowę polimerową w mieszarce bębnowej, przy czym napełniacz ma frakcję do 2 mm (korzystnie 0,4–0,6 mm) w ilościach mas. 60–90% (korzystnie 70–85%), natomiast osnowa jest w postaci sproszkowanego tworzywa sztucznego LDPE o frakcji 150–200 μm w ilości mas. odpowiednio do napełniacza 10–40% (korzystnie 15–30%) umieszcza się mieszaninę w gnieździe formy prasowniczej, a następnie; homogenizuje się w temperaturze wynoszącej 170±5°C oraz pod ciśnieniem 13–20 MPa (korzystnie 17-18 MPa), przy użyciu prasy w czasie do 500 s (korzystnie 300-480 s), a następnie kompozyt zestala się w gnieździe formującym pod ciśnieniem 15–25 MPa (korzystnie 18–21 MPa) i w temperaturze homogenizacji, aż do schłodzenia do temperatury poniżej 50°C, od momentu uplastycznienia polimeru do otrzymania wypraski w czasie nie dłuższym niż 1800 s (korzystnie 1200-1500 s), rozdrabnia kompozytowe wypraski prasownicze do postaci granulatu o ziarnach poniżej 3 mm (wg Biul. Urz. Pat. 2024, nr 51, 17).

mgr inż. Małgorzata Choroś

NEW BOOKS

NANOCOMPOSITE MANUFACTURING TECHNOLOGIES
Fundamental Principles, Mechanisms, and Processing
Editors: Alokesh Pramanik, Animesh Basak, Yu Dong, Chander Prakash, J. Paulo Davim (Elsevier)
1st edition, 2025, 718 pages, 265.00 EUR
ISBN 9780128243299
ISBN 9780128243305 (e-Book)

The book provides the latest research in innovative manufacturing methods to produce nanocomposite materials for a range of applications. Nanocomposite material research has advanced rapidly in the past decade, revealing important insights into the nature of fiber or particle reinforcements on a nanoscale, unique properties, and specific new-generation uses. Emerging techniques such as additive manufacturing, friction stir processing, and rapid prototyping are opening a new era for nanocomposite manufacturing, and this comes with certain challenges. This book collates the most important of related research findings into a single volume and presents them alongside the latest advances in manufacturing technology to provide a coherent resource for students, researchers, and industrial R&D staff to navigate this field. Detailed descriptions of nanocomposite manufacturing processes help readers to understand the differences between them and to choose which process or combination of processes will lead to the material that solves a specific design challenge and advances product development. This book will be a valuable source of information for researchers and students in engineering and materials science with an interest in manufacturing with composites, manufacturing engineers, production supervisors, and tooling engineers, working with nanocomposites.

POLYMERIC LIQUIDS & NETWORKS
Dynamics and Rheology
William W. Graessley (CRC Press)
1st edition, 2024, 832 pages, 166.50 GBP
ISBN 9780815341710
ISBN 9781003573487 (e-Book)

The book is a second part of a two-volume treatise serving as a status report on a broad area of polymer science research. It represents an effort to unify and consolidate the work of many polymer researchers from all over the world, over the past 60-70 years. Both books are based on the graduate courses taught by the author at Princeton and Northwestern. The increasing need to apply new understandings about liquid structure to rheological behavior squeezed equilibrium aspects out of the rheology course and into other graduate course, which eventually became the basis for Volume 1, Structure and Properties, published in 2004. Volume 2 follows the original plan by building upon Volume 1, covering continuum background along with experimental observations, then molecular theories and applications to such topics as solution properties, long-chain branching and structural heterodispersity.

This textbook aims to leave readers with a solid grounding in the principles that underlie the dynamics and rheological behavior of flexible chain polymer liquids and networks. Readers will develop an informed intuitive understanding of the connections between polymeric structure and rheological response. Theory, experiment, and simulation are woven together so as to leave the reader with a balanced grasp of the various areas, including exposure to important unsolved puzzles. The book will be a great resource for a range of academic researchers in chemistry, physics, materials science, and chemical engineering.

ADVANCED HYBRID NANOMATERIALS FOR ENERGY STORAGE
Editors: Won-Chun Oh, Suresh Sagadevan (CRC Press)
1st edition, 2024, 327 pages, 112 GBP
ISBN 9781032817279
ISBN 9781003561262 (e-Book)

Integrating nanotechnology and sustainable energy frontiers, in the book explores the groundbreaking field of material design at the nanoscale for next-generation energy storage solutions. This comprehensive text delves into the synthesis, characterization, and optimization of hybrid nanomaterials developed by combining the advantageous properties of diverse materials. This diverse range of materials includes metal oxides, carbon nanostructures, biopolymers, and functionalized surfaces. These materials have the potential to revolutionize energy storage technologies such as batteries and supercapacitors due to their synergistic properties and innovative applications. This book explores the latest advances in hybrid nanomaterial design for energy storage applications, discusses the benefits of combining different materials at the nanoscale range, exhibiting their combined properties which significantly outperform those of individual components, defines the various types of hybrid nanomaterials, including metal oxide/carbon nanocomposites, metal-doped composites, and biopolymer-based materials. It also focuses on the real-world implications of hybrid nanomaterials in battery electrodes, supercapacitor electrodes, and other energy storage devices and summarizes the important role of these materials in tran-

sitioning to a clean and sustainable energy environment. This book serves as an important resource for both industry professionals and academic researchers and is ideal for scientists and engineers working in advanced materials for energy storage applications.

BIOCOMPOSITES FOR LIGHTWEIGHT SANDWICH STRUCTURES
Engineering Properties and Applications
Editors: M.Y.M. Zuhri, S. M. Sapuan (CRC Press)
1st edition, 190 pages, 112.00 GBP
ISBN 9781032438146
ISBN 9781003368977 (e-Book)

The book highlights how the relationship between biocomposites and sandwich structures can provide a unique combination of superior properties that can be optimized for environmentally friendly lightweight applications. It introduces current performance of biocomposites, sandwich structure applications, machining and manufacturing methods, energy-absorbing capabilities, and strengthening techniques of structures, as well as potential, challenges, and future perspectives on performance improvement. The publication provides latest research on biocomposites and use in lightweight engineering applications, explores the suitability of core designs using biocomposites and related environmentally friendly materials, includes recent manufacturing technologies and important performance criteria of sustainable materials for lightweight structures and discusses existing commercial materials and those that are currently under research and development.

This comprehensive reference will be of interest to materials, mechanical, and aerospace engineers and those working in related fields interested in development of materials for lightweight designs.

SURFACE AND INTERFACE ANALYSIS: PRINCIPLES AND APPLICATIONS
Seong H. Kim (Wiley)
1st edition, 2024, 416 pages, 115.80 EUR
ISBN 9781394218349
ISBN 9781394218363 (e-Book)

The publication is a comprehensive textbook resource that covers everything readers need to know about surface energy, molecular speciation, and optical and physical characterization techniques. Assuming only basic knowledge of general chemistry (electronic orbitals, organic functional groups), physics (electromagnetic waves, Maxwell equations), physical chemistry (Schrödinger equation, harmonic oscillator), and mathematics (wave equations, covariance matrix), this textbook helps readers understand the underlying principles of the discussed characterization techniques and enables them to transform theoretical knowledge into applied skills through a Maieutic pedagogical approach. Written by a highly qualified professor, includes information on relationship between atomic and molecular orbitals and compositional analysis principles based on measurements of photoelectrons, Auger electrons, X-rays, and secondary ions emitted from the surface. It also covers governance of electromagnetic wave propagation in a dielectric medium and what can be learned from analyzing the electromagnetic wave reflected from the interface and surface metrology using light reflection (non-contact) and scanning probe (contact) and analysis of mechanical properties through indentation. There is also discussed artifacts and misinterpretations that may be encountered during analysis.

The book is an ideal textbook resource on the subject for graduate students in the fields of solid state physics, optics, materials science, chemistry, and engineering who want to learn and apply advanced materials characterization methods, along with undergraduate students in advanced elective courses.

PHYSICAL DEPOSITION METHODS FOR FILMS AND COATINGS
Lech Pawlowski (Wiley)
1st edition, 2025, 432 pages, 159.99 EUR
ISBN 9781119713067
ISBN 9781119713135 (e-Book)

The textbook presents a pedagogical compilation of current knowledge of dry deposition. Written by a renowned and awarded academic with more than 40 years of experience in the field covers topics including the process of making a deposit that appears on the surface, growth of deposits, their post treatments, and characterization methods. Different physical and chemical deposition techniques including atomistic, chemical vapor, and various thermal spraying methods is also discussed. Properties of deposits depending on the material and deposition technique with substrate preparation, coating microstructure, and morphology and stability of thin films is also presented with examples of applications of thin films in optical devices, environmental applications, telecommunications devices, and energy storage devices. The book is an essential reference on the subject for professionals and researchers in surface treatment and graduate students in related programs of study.

BIO-NANOMATERIALS IN ENVIRONMENTAL REMEDIATION: INDUSTRIAL APPLICATIONS
Editors: Narendra K. Sharma, Rekha Sharma, Tikam C. Dakal (Wiley)
1st edition, 2024, 352 pages, 133.99 EUR
ISBN 9783527848546
ISBN 9783527848522 (e-Book)

The book discusses the application of bio-nanomaterials in various industrial settings. This publication includes information on fundamentals, classification, and applications of bio-nanomaterials, technologies for the fabrication of bio-nanomaterials, and desalination of wastewater using bio-nanomaterials, as well as applications of bio-nanomaterials in the textiles, oil, gas, food,

and agriculture industries. It also covers hazard, toxicity, and monitoring standards of bio-nanomaterials according to the current challenges of bio-nanomaterials in industrial applications and future outlooks in the field. Reader can also find here strategies to manage the safety of bio-nanomaterials to enable the creation of healthy and pollution-free environments. The book is an essential up-to-date reference for professionals, researchers, and scientists working in fields where bio-nanomaterials are used.

CARBON-BASED NANOMATERIALS FOR GREEN APPLICATIONS

Editors: Upendra Kumar, Piyush Kumar Sonkar, Suman Lata Tripathi (Wiley)

1st edition, 2025, 640 pages, 149.60 EUR

ISBN 9781394243396

ISBN 9781394243402 (e-Book)

The green revolution is the most important technological development of the new century. Carbon-based nanomaterials, with their organic origins and immense range of applications, are increasingly central to this revolution as it unfolds. There is an urgent need for an up-to-date overview of the latest research in this ever-expanding field. The book meets this need by providing a brief outline of the synthesis and characterization of different carbon-based nanomaterials, including their historical backgrounds. It proceeds to move through each major category, outlining properties and applications for each. The result is an essential contribution to a huge range of sustainable and renewable industries. With contributions from a global list of distinguished writers, the book includes the discussion of nanomaterial applications in fields from drug delivery to biomedical technology to optics, analysis of nanomaterial categories including graphene, fullerene, mesoporous carbon, and many more. It also covers separate chapters describing aspects of supercapacitors, solar cells, and fuel cells. The textbook is ideal for scientists and researchers working in nanotechnology, life sciences, biomedical research, bioengineering, and a range of related fields.

ENCYCLOPEDIA OF POLYMER DEGRADATION

George Wypych (Elsevier)

1st edition, 2025, 350 pages, 277.09 EUR

ISBN 9781774670484

ISBN 9781774670491 (e-Book)

Encyclopedia of Polymer Degradation compiles research results for the most important and commonly-used polymers, identifying their unitary degradative chemical reactions, including the fate of products resulting from primary degradation which can influence further degradation mechanisms and rates. The book proposes potential mechanisms of reactions and chemical descriptions of the sequence for events for each degradation mode. It takes a knowledge-based approach with the aim of facilitating more effective prevention of waste and environmental pollution caused by material failures, and also discusses the limitations of typical weathering studies, challenges in lab-based weathering studies, and the importance of understanding various degradation mechanisms. This publication is a great source of knowledge for researchers in materials/polymer science and various engineering fields, practicing materials/polymer scientists and professional engineers.

HYDROGELS IN DRUG DELIVERY

Advances in the Manufacture, Characterization, and Application of Hydrogels to Address Current Global Healthcare Challenges

Editors: Alejandro J. Paredes, Eneko Larrañeta, Garry Laverty, Ryan F. Donnelly (Elsevier)

1st edition, 2025, 350 pages, 277.09 EUR

ISBN 9780443220173

ISBN 9780443220180 (e-Book)

This publication presents the latest advances in hydrogels, ranging from their basic chemistry to specific application of existing and novel hydrogels in controlled drug delivery and biomedicine. Hydrogels have been increasingly used in the development of novel formulations in a wide variety of therapeutic and monitoring applications. Multidisciplinary work carried out by researchers working in synthetic chemistry, drug delivery, biomedicine and other fields has led to the development of novel polymers, enabling the preparation of hydrogels with adjustable physicochemical properties. Accordingly, these materials offer multiple advantages over other drug delivery systems, including an increased patient compliance by reducing the required number of medication doses, reducing the healing time in injuries, and simplifying patient monitoring by reducing the invasiveness of current methods. The book is an essential resource for graduate students and researchers working within drug delivery and synthetic chemistry, biomedicine, material science, pharmacology, and chemical engineering.

dr Agnieszka Szadkowska
mgr Mateusz Borkowski

Guide for Authors

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Papers constituting literature reviews should contain elaboration of the presented subject matter, including possibly exhaustive set of world publications. The text should be divided into parts and possibly also chapters and subchapters constituting finite entireties.

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Abstracts in both English and Polish (up to 500 characters) shall include basic information concerning the content of the paper.

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In the paper there shall be used SI units. Polymer names should be substituted with international letter symbols, explained after the first usage.

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Tables, marked with consecutive numerals, shall be placed in the text of article.

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Mathematical equations (prepared using MS Word equation editor) marked with consecutive Arabic numerals, shall be placed in the text, each in a new line. Symbols used in equations should have the same size and style as the surrounding text.

Chemical formulas and equations

Chemical formulas and equations shall be marked with consecutive Latin letters (*e.g.* Scheme A). They shall be written with ChemWin program, Palatino Linotype font, 9 pt, in sub/superscripts 7 pt, bonds 2 mm long).

If the equation breadth exceeds the column breadth (8.8 cm) it shall be broken into separate lines at the arrow or plus character and equations impossible to break shall be drawn through both columns (max. 17.6 cm). Line spacing shall be 4 mm.

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Figures (schemes, photographs and graphs)

Width of figures shall not exceed 8.6 cm and only in justified cases – 17.2 cm. They shall be embedded in Word documents in the text of the article and send in separte files in original format (preferred formats: *Excel*, *CorelDraw X5* or lower, *Adobe Illustrator, EPS*).

Please also send photos in separate files (JPEG, TIFF), propertly described. Resolution of photographs shall be min. 300 dpi.

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REFERENCES

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[1] Gaina C., Gaina V., Sara M. *et al.*: *Journal of Macromolecular Science, Part A. Pure and Applied Chemistry* **1996**, *33(11)*, 1755.

https://doi.org/10.1080/10601329608010939

[2] Krijgsman J., Feijen J., Gaymans R. J.: *Polymer* **2004**, *45(13)*, 4677.

https://doi.org/10.1016/j.polymer.2004.04.038

[3] Nam Ch.K., Yong T.K., Sung W.N. *et al.*: *Polymer Bulletin* **2013**, *70*, 23.

https://doi.org/10.1007/s00289-012-0816-9

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[1] Lenz R: "Organic chemistry of synthetic high polymers", Interscience Publishers, John Wiley and Sons, New York, London, Sydney 1967, p. 742.

A patent or patent application

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[1] *Pat. Jap.* 1 135 663 (1989).

[2] *Pat. Appl. Pol.* 393 092 (2010).

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Web sites

[Item No]Web address (access date dd.mm.yyyy)

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[1] http://www.sigmaaldrich.com/catalog/product/aldrich/94829?Lang=pl&version=PL (access date 12.11.2013)

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