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 kwietniu i maju 2025 r.

T a b e l a 1. Produkcja surowców i półproduktów chemicznych w kwietniu i maju 2025 r., t
T a b l e 1. Production (tons) of raw materials and chemical intermediates in April and May 2025

Artykuł	Średnia miesięczna w 2024 r.	Kwiecień 2025 r.	Maj 2025 r.	Razem I–V 2025 r.	% I–V 2025/ I–V 2024
Węgiel kamienny	3 685 345	3 154 616	3 008 151	17 401 483	95,0
Węgiel brunatny	3 418 819	2 635 727	2 700 813	16 506 150	100,8
Ropa naftowa – wydobycie w kraju	50 587	55 526	56 194	279 708	104,6
Gaz ziemny – wydobycie w kraju (tys. m^3)	402 935	455 541	403 106	2 205 301	104,5
Etylen	28 610	23 547	24 500	118 590	77,4
Propylen	32 222	32 234	31 826	167 104	98,9
1,3-Butadien	4 393	4 721	5 028	24 378	99,2
Fenol	3 148	3 050	3 487	16 561	96,6
Izocyjaniany	238	232	191	1 185	90,4
ε-Kaprolaktam	8 617	8 165	7 941	40 712	95,6

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T a b e l a 2. Produkcja najważniejszych tworzyw polimerowych i polimerów w kwietniu i maju 2025 r., t
T a b l e 2. Production (tons) of major polymer materials and polymers in April and May 2025

Tworzywo polimerowe/polimer	Średnia miesięczna w 2024 r.	Kwiecień 2025 r.	Maj 2025 r.	Razem I–V 2025 r.	% I–V 2025/ I–V 2024
Tworzywa polimerowe	261 577	244 573	252 138	1 309 265	93,5
Polietylen	26 062	23 854	27 749	124 128	94,0
Polimery styrenu	12 449	11 509	14 128	67 025	97,9
Poli(chlorek winylu) niezmieszany z innymi substancjami, w formach podstawowych	17 594	4 000	6 460	40 920	41,8
Poli(chlorek winylu) nieuplastyczniony, zmieszany z dowolną substancją, w formach podstawowych	3 322	3 400	4 058	17 569	98,4
Poli(chlorek winylu) uplastyczniony, zmieszany z dowolną substancją, w formach podstawowych	8 205	8 808	8 440	42 463	97,0
Poliacetale, w formach podstawowych	19	6	26	87	102,4
Glikole polietylenowe i alkohole polieterowe, w formach podstawowych	7 488	6 494	6 547	35 468	86,0
Żywice epoksydowe, w formach podstawowych	931	1 132	1 187	5 394	110,0
Poliwęglany	1 531	1 501	1 652	8 073	96,0
Żywice alkidowe, w formach podstawowych	2 031	2 424	1 982	12 143	105,8
Poliestry nienasycone, w formach podstawowych	7 654	6 937	8 274	36 278	90,9
Poliestry pozostałe	4 899	5 720	6 370	29 380	114,5
Polipropylen	25 693	28 492	33 914	183 556	128,3
Polimery octanu winylu w dyspersji wodnej	3 618	3 234	3 182	17 707	91,9
Poliamidy 6; 11; 12; 66; 69; 610; 612, w formach podstawowych	17 116	17 888	17 087	92 025	94,5
Aminoplasty	20 365	25 337	23 449	118 253	111,8
Poliuretany	1 689	1 815	1 597	8 797	114,5
Kauczuki syntetyczne	22 309	24 755	20 191	119 800	105,4

Wg danych GUS.

T a b e l a 3. Produkcja wybranych wyrobów z tworzyw polimerowych w kwietniu i maju 2025 r.
T a b l e 3. Production of some polymer products in April and May 2025

Wyrób	Jednostka	Średnia miesięczna w 2024 r.	Kwiecień 2025 r.	Maj 2025 r.	Razem I–V 2025 r.	% I–V 2025/ I–V 2024
Wyroby z tworzyw polimerowych	tys. zł	6 828 748	7 027 088	6 951 204	34 574 974	99,0
Rury, przewody i węże sztywne z tworzyw polimerowych	t	27 420	28 857	32 808	144 151	104,0
w tym: rury, przewody i węże z polimerów etylenu	t	10 481	11 541	13 173	57 615	115,0
rury, przewody i węże z polimerów chlorku winylu	t	8 693	9 089	10 784	45 920	110,9
Wyposażenie z tworzyw polimerowych do rur i przewodów	t	4 342	5 076	3 728	22 493	104,8
Płyty, arkusze, folie, taśmy i pasy z polimerów etylenu, o grubości < 0,125 mm	t	52 127	55 030	57 199	287 358	106,3
Płyty, arkusze, folie, taśmy i pasy z polimerów propylenu, o grubości ≤ 0,10 mm	t	14 183	13 068	14 294	70 446	103,9
Płyty, arkusze, folie, taśmy i pasy z komórkowych polimerów styrenu	t	37 884	38 716	38 622	181 387	105,4
w tym: do zewnętrznego ocieplania ścian	t tys. m²	13 115 8 858	13 552 8 572	13 754 8 954	63 767 41 856	102,8 101,3
Worki i torby z polimerów etylenu i innych	t	27 059	23 211	26 029	130 999	107,6
Pudełka, skrzynki, klatki i podobne artykuły z tworzyw polimerowych	t	24 293	22 732	23 570	120 632	101,0
Pokrycia podłogowe (wykładziny), ścienne, sufitowe	t tys. m²	8 903 2 183	10 636 2 951	10 578 3 150	50 742 14 105	114,2 125,0
Drzwi, okna, ościeżnice drzwiowe	t tys. szt.	46 097 805	48 233 861	48 086 867	225 236 4 074	100,9 102,0
Okładziny ścienne, zewnętrzne	t tys. m²	299 107	349 121	431 187	1 464 469	109,1 106,6
Kleje na bazie żywic syntetycznych	t	6 472	9 903	7 831	43 753	206,1
Kleje poliuretanowe	t	1 492	1 354	1 500	7 591	167,4
Włókna chemiczne	t	2 863	2 832	2 795	14 493	99,1
Tkaniny kordowe (oponowe) z włókien syntetycznych	t tys. m²	1 332 4 251	1 155 3 696	1 356 4 341	6 591 21 059	91,1 99,9
Nici do szycia z włókien chemicznych	t	13	38	38	191	92,7

Wg danych GUS.

T a b e l a 4. Produkcja wybranych wyrobów z gumy w kwietniu i maju 2025 r.
T a b l e 4. Production of some rubber products in April and May 2025

Wyrób	Jednostka	Średnia miesięczna w 2024 r.	Kwiecień 2025 r.	Maj 2025 r.	Razem I–V 2025 r.	% I–V 2025/ I–V 2024
Wyroby z gumy, produkcja wytworzona	t	75 520	73 768	81 026	385 438	94,9
Opony i dętki z gumy; bieżnikowane i regenerowane opony z gumy	t tys. szt.	37 666 4 574	35 757 4 386	41 099 4 936	191 457 24 256	95,2 107,6
w tym: opony do samochodów osobowych	tys. szt.	2 246	2 095	2 508	11 334	101,4
opony do samochodów ciężarowych i autobusów	tys. szt.	245	327	363	1 662	141,2
opony do ciągników	tys. szt.	6	4	3	22	68,0
opony do maszyn rolniczych	tys. szt.	29	39	37	197	138,6
Przewody giętkie wzmocnione metalem	t	1 435	1 289	1 321	6 641	81,1
Taśmy przenośnikowe	t km	3 206 2 370	2 413 2 212	2 636 1 502	14 210 11 023	75,4 89,8

Wg danych GUS.

mgr inż. Małgorzata Choroś

Green Grill 2025 in Warsaw: Accelerating the Green Transition

On 11 September 2025, representatives from the Polish and Italian business communities, public institutions, and innovative enterprises will meet in Warsaw for Green Grill 2025, an event dedicated to sustainable development, innovation, and international networking. Hosted at the headquarters of Confindustria Polonia, the meeting will be conducted in English. Participation is free of charge but requires prior registration. Organised by Confindustria Polonia in cooperation with Italian Exhibition Group (IEG), the initiative aims to strengthen Polish–Italian cooperation in the green economy by focusing on four key challenges of ecological transformation: water, waste, biogas, and solar energy. The official opening will feature speeches from Luca Franchetti Pardo, Ambassador of Italy to Poland; Roberto Cafiero, Director of the Italian Trade Agency Office in Warsaw; Marco Gambini, President of Confindustria Polonia; and Mauro Delle Fratte, Exhibition Manager for Ecomondo at IEG. The conference programme will bring together environmental experts and sustainable innovation leaders, including Carlo Piscitello from ISPRA (Italian Institute for Environmental Protection and Research); Gian Francesco Galanzino, CEO of Entsorga and representative of the Italian Composting Consortium; Federico Brunelli, European Director at AIKO; and Camilla Braguglia from the Water Research Institute, CNR–IRSA. A dedicated case-study session will showcase proven green solutions already implemented in practice. Companies such as Aliplast Polska, Entsorga, I Maximum, and BTT SRL will present projects illustrating real-world cooperation and technology transfer between Poland and Italy. By combining high-level discussions with practical examples, Green Grill 2025 aims to create a platform for building partnerships, exchanging know-how, and accelerating the adoption of sustainable practices across borders.

https://www.plastech.pl/

Grupa Recykl Targets Stronger European Presence Through Strategic Acquisitions

Following its acquisition of Lithuanian tyre recycling company APG earlier this year, Poland's Grupa Recykl—the country's market leader in end-of-life tyre recovery—is now focusing on finalising a second strategic acquisition in Germany during the second half of 2025. Parallel to these expansion efforts, the company is increasing production capacity for its Smapol mineral–asphalt additive at its Chełm facility. "Finalising the second acquisition is a key step in the Group's development," emphasised CEO Maciej Jasiewicz. "Looking more strategically, we want to systematically strengthen our market position across Europe and increase export sales, including to other continents. Our plan also involves full compliance with ESG-related requirements. We are working on a sustainable development strategy and implementing new solutions across our operations." Demand for recycled tyre-derived products remains healthy, though Jasiewicz notes that the broader industry is shaped by cost pressures, local and regional conditions, and technological and logistical factors—issues highlighted in last year's report by the Polish Tyre Recyclers Association. The APG acquisition brought Grupa Recykl access to an annual 20,000 tonnes of material collected and processed across Lithuania, Latvia, and Estonia, securing raw material supply and opening up new sourcing and sales opportunities, including for Smapol. According to Jasiewicz, the Baltic region offers an attractive gateway for future expansion into Scandinavia, though the immediate priority is integration of APG into the Group's operations, particularly in logistics. "We do not rule out that, with growth and entry into new markets for which Lithuania will be the starting point, we will decide to build a state-of-the-art recycling plant here," he added, estimating the potential of the Baltic and Scandinavian markets at around 200,000 tonnes of tyres annually. In Germany, the Group has completed due diligence and is negotiating acquisition terms, with the transaction expected to close in Q3 or Q4 2025. In April, Grupa Recykl signed a term sheet with the Foreign Expansion Fund 2 FIZ AN, managed by PFR TFI, for a loan facility of up to €6 million to finance overseas investments. The agreement, expected to be signed in mid-2025, will fund the German acquisition and refinance debt related to the Lithuanian deal. "We must continue to grow, pursue expansion, and set ourselves new goals, even though the market environment is not easy," Jasiewicz concluded. "With each step, we gain access to new markets, often with more favourable raw material procurement conditions, and the ability to increase tyre processing volumes in the future."

https://www.plastech.pl/

TAROPAK 2025 Gains Industry Endorsement from Polish Union of Plastics Processors

The International Packaging and Labelling Technology Fair TAROPAK 2025 will take place from 24–26 September at the Poznań International Fairgrounds. This year's edition, traditionally held alongside the POLAGRA fair, takes on added significance through the industry patronage of the Polish Union of Plastics Processors (PZPTS). Ticket sales for the event—one of the most important gatherings for the packaging sector in Central and Eastern Europe—are now officially open. For the plastics industry, and especially companies engaged in the production and processing of packaging materials, TAROPAK has long served as a strategic platform for knowledge exchange, business networking, and a comprehensive showcase of technological innovation. As the event's industry patron, PZPTS is actively promoting the fair within the plastics processing community, emphasising the importance of strong representation from this market

segment. According to the Union, TAROPAK is not only a venue for presenting the latest machinery and technologies, but also a forum for substantive discussions on the future of packaging, including environmental challenges and upcoming legislative changes such as the EU's Packaging and Packaging Waste Regulation (PPWR). "We encourage all companies from the plastics sector to participate in this year's edition of TAROPAK," said PZPTS Managing Director Robert Szyman. "It is an opportunity to demonstrate the strength and innovation of our industry and to have a real impact on the direction of the packaging market in Poland and across Europe." The Union's presence as an official patron is expected to strengthen the voice of Polish plastics processors in debates about the role of plastics in packaging—particularly in terms of recyclability, material efficiency, and carbon footprint reduction. For many companies in the sector, the fair will also provide a stage to present tangible solutions aligned with circular economy principles. TAROPAK has a long-standing tradition, attracting exhibitors from more than a dozen countries and thousands of visitors. In 2024, over 160 companies showcased their offerings at the Poznań International Fair, with attendance exceeding 20,000 visitors. The 2025 edition is shaping up to be equally dynamic, both in terms of turnout and the number of innovations on display.

https://tworzywa.online/

Kayser Automotive Expands Polish Manufacturing Facility

Kayser Automotive Systems has completed the latest expansion phase of its plant in Jaszkowa Dolna, operating since 2015 within the Wałbrzych Special Economic Zone "INVEST-PARK." The investment included enlarging the production floor, constructing new technical and warehouse facilities, and upgrading infrastructure to boost manufacturing capacity and streamline workflow. Today, the factory is one of the largest employers in the region, with a workforce exceeding 700—up from just 120 at the start of operations. The expansion was partially financed through support instruments offered by the economic zone, including public aid in the form of corporate income tax relief. This allowed the company to recover around PLN 2 million in investment costs, which have been reinvested into further infrastructure development and the purchase of advanced production equipment. The Jaszkowa Dolna plant produces plastic and elastomer components for the automotive industry, including fuel and cooling lines, connectors, thermal modules, and exhaust system elements. Its customers include leading global automotive groups such as Volkswagen, BMW, Ford, and Stellantis. Kayser Automotive Systems is a global supplier with operations in Germany, Spain, Italy, the United States, Mexico, China, and India. Unified technological and organisational structures across all locations ensure consistent quality standards and processes worldwide. The completion of this expansion not only strengthens the role of the Jaszkowa Dolna facility within the Kayser Group's network, but also demonstrates that modern plastics processing industries can be a stable and lasting contributor to regional economic growth.

https://tworzywa.online/

Oświęcim: Alupol Films Invests PLN 300 Million in State-of-the-Art BOPP Film Line

Alupol Films, a subsidiary of Grupa Kęty, will invest PLN 300 million in Oświęcim to build one of the most advanced biaxially oriented polypropylene (BOPP) film production lines in Europe. The project, located within the Kraków Technology Park (KPT), has received support under Poland's Investment Zone (PSI) programme and represents the largest public-aid decision granted in the Małopolska region in 2025. The new co-extrusion line will enable the production of high-quality, multilayer packaging films with enhanced performance characteristics, primarily for the food and cosmetics industries. The investment will significantly boost the plant's production capacity and strengthen its competitiveness in international markets. Accompanying infrastructure upgrades will ensure full utilisation of the new technology and optimisation of operational processes. "This is the largest support we have granted this year, and the second half has only just begun," emphasised Andrzej Kulig, President of Kraków Technology Park, commenting on the PSI decision. Under the programme, Alupol Films will benefit from corporate income tax exemption for up to 15 years.

While this is the company's first decision under the new investment support system, Alupol Films has previously benefited from public-aid schemes within special economic zones—investing PLN 150 million in 2015 and PLN 90 million in 2016 at its Oświęcim site. By the end of July 2025, Kraków Technology Park had issued 33 investment support decisions, six of which went to large enterprises, with total declared expenditures exceeding PLN 750 million. The new investment marks a clear step forward in modernising Poland's plastics processing industry, combining advanced technology, improved efficiency, and environmental responsibility. It also represents a significant development boost for the wider Małopolska region.

https://tworzywa.online/

Shanghai Pret Composites Launches First European Manufacturing Facility in Opole

Shanghai Pret Composites Co., Ltd., one of Asia's largest producers of thermoplastic composites, is set to open its first manufacturing plant in Europe. The company has leased 7,071 m² of space in the OPOL 4 building at CT Park Opole, with production scheduled to begin before the end of 2025. The new facility will supply Euro-

pean customers in the automotive sector. Specialising in lightweight, multi-layer composite materials for vehicle interiors, Shanghai Pret manufactures components such as dashboards, door panels, centre consoles, headliners, acoustic mats, and luggage compartment covers. Core materials include polypropylene (PP), polyamides (PA), reinforcing additives such as glass or natural fibres, technical foams, and decorative surface layers. According to the company's official statements, its production capabilities are built on several key plastics processing technologies: multi-layer co-extrusion, thermoforming of composite sheets, compression moulding, and lamination with surface finishing. These techniques enable the production of lightweight, functional automotive interior components, often featuring soft-touch surfaces alongside acoustic and impact-resistant properties. While details of the Opole plant's equipment have not yet been disclosed, it is expected that at least some of these technologies will be implemented in Poland to meet the needs of local OEM and Tier 1 customers. The Opole operation will be housed in a modern industrial facility tailored for processing activities, with options for upgrading power connections, installing photovoltaic systems, and using energy-efficient ventilation. Shanghai Pret has announced that the site will meet EU standards for energy efficiency and circular economy practices, incorporating recycled content in materials and optimising processes for reduced energy use and emissions. Employing more than 3,000 people worldwide, Shanghai Pret Composites operates plants and R&D centres in China, Thailand, and the United States. The Opole investment marks the company's first step into the European market and forms part of its strategy to shorten supply chains and increase local presence in regions with strong industrial potential.

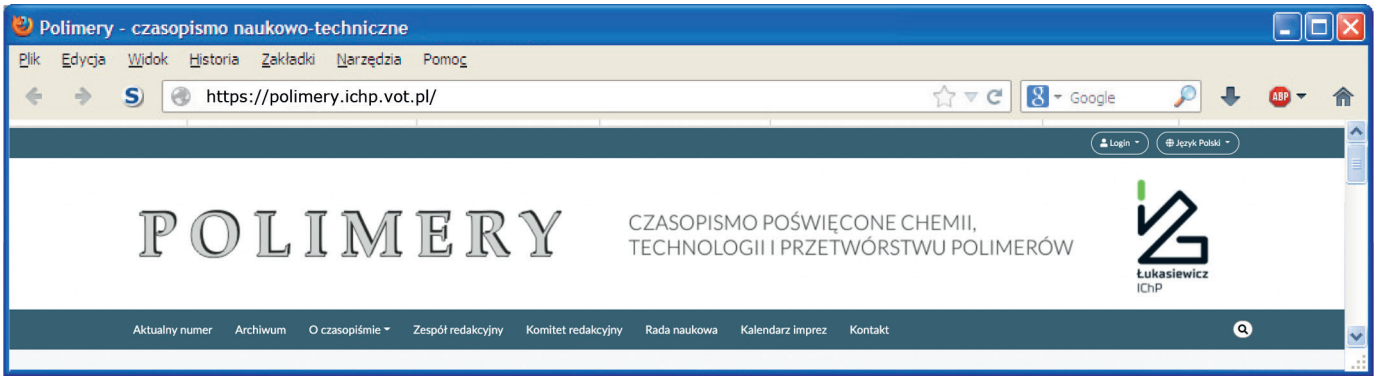
https://tworzywa.online/

Wittmann Battenfeld Polska Moves to New Headquarters

Wittmann Battenfeld Polska has completed its relocation to a new headquarters in Krze Duże, near Radziejowice. The modern facility, located directly along the S8 expressway, has been designed to support the company's expanding training and demonstration activities while providing improved working conditions for its team. Situated on a 16,400 m² plot, the new two-storey building offers 470 m² of office space and 480 m² of laboratory and warehouse areas, accommodating around 25 employees. Construction began in October 2023, and the facility was operationally handed over in early July 2025. The office areas are fully completed, while final finishing work continues in the laboratory, which is being equipped with an injection moulding machine paired with a robot, an additional stand-alone robot, and a range of auxiliary equipment including dryers, temperature controllers, granulators, and dosing units. This space will serve as a dedicated training and demonstration hub. Adjacent to the laboratory is a presentation hall for up to 30 participants, with a removable partition wall allowing the area to be adapted for larger events and broader audiences. As company president Bogdan Zabrzewski noted, the hall is intended as a venue for industry gatherings, including lectures, presentations, and live demonstrations of plastics processing machinery and technologies. Training and demonstration programmes are scheduled to launch in the autumn, welcoming both technology-focused professionals and those seeking a comprehensive understanding of the Wittmann Group's integrated solutions. "We moved without champagne and without fireworks," Zabrzewski commented. "As with any relocation, the joy of a new place was tempered by the exhaustion of the work. But we're here now, getting settled, and ready to welcome you." The Wittmann Group is one of the world's leading suppliers of plastics processing technologies, offering complete production systems that include injection moulding machines, robots, and auxiliary equipment. With a presence in over 30 countries, the company combines engineering expertise with an innovative approach to automation, digitalisation, and sustainable manufacturing. The new Polish headquarters marks another step in strengthening its position in one of Central and Eastern Europe's most important markets.

https://www.plastech.pl/

M. Sc. Mateusz Borkowski



WORLD NEWS

Promix Solutions Introduces Microcell Technology to Enhance Window System Insulation

The insulation performance of modern window systems is largely determined by thermal break profiles, which act as barriers to heat transfer between structural elements such as window frames. Promix Solutions has unveiled its Microcell Technology, enabling thermal break profiles to be physically foamed through the controlled addition of atmospheric gases. This process delivers significantly improved insulation properties, supporting energy-efficient construction and reduced carbon footprints. In aluminium windows—where the high thermal conductivity of metals often results in cold surfaces in winter and heat build-up in summer—thermal break profiles made of polyamide are used to separate the inner and outer frames. These profiles typically incorporate glass fibres to maintain the mechanical strength needed for demanding applications, such as in high-rise buildings. Standard 25% glass fibre-reinforced polyamide offers a thermal conductivity (lambda) of 0.40 W/(m·K), more than 400 times lower than aluminium at approximately 160 W/(m·K). While a single thermal break significantly improves insulation, further reducing thermal conductivity can yield additional energy savings. Microcell Technology achieves this by physically foaming the same polyamide composite material, generating a microcellular structure using atmospheric gases such as nitrogen or carbon dioxide. This reduces the composite density from 1.31 kg/dm^3 to 1.0±0.1 kg/dm^3, lowering the lambda value to approximately 0.20 W/(m·K). Despite the reduced density, the microcellular profiles maintain mechanical properties comparable to solid polyamide profiles, ensuring durability while setting a new performance benchmark for insulation between aluminium profiles. The result is a next-generation thermal break profile that combines high structural integrity with outstanding thermal efficiency—particularly beneficial in climates with extreme seasonal temperature variations.

https://interplasinsights.com/

Trelleborg Medical Solutions Expands U.S. Innovation Center to Boost Tooling, Molding, and Automation Capabilities

Trelleborg Medical Solutions is expanding its U.S.-based Innovation Center to meet growing demand and accelerate design-to-market timelines for medical technology customers. Currently located in Plymouth, Minnesota, the facility will relocate to a newly built, purpose-designed 45,000+ sq ft site in nearby Delano. The expansion includes a remodeled tool shop enlarged to 6,000 sq ft, nearly 40,000 sq ft of new construction housing a visitor center, additional high-end Swiss machining, expanded injection molding capacity, and more space for the automation laboratory. Part of Sweden-based Trelleborg, the division applies advanced polymer expertise to a wide range of medtech applications, aiming to provide high-quality, reliable supply from early prototyping to high-volume production. "This investment enables Trelleborg to deliver on all aspects and provide an exceptional experience to our customers from early-stage prototyping all the way to high-volume commercialization, all under one roof," said Kevin Ehlert, Business Unit President of Medical Device Solutions for the Americas. Chris Tellers, Innovation Center and New Product Development Director, added: "The additional Swiss machining and injection molding will enhance our in-house capabilities to provide the highest quality components fast without relying on outside shops. The increased space for automation will give us scalability to support future projects." The new visitor center will serve as a collaborative, high-tech meeting space where customers can develop project ideas alongside Trelleborg's experts. The company is also integrating its recently launched certified toolmaker apprenticeship program into the expansion. Launched in May 2025, the four-year program trains apprentices to build, troubleshoot, and repair molds, fixtures, and related tools under experienced mentorship, with graduates eligible for positions as Toolmaker Class B or Machinist, and potential promotion to Toolmaker Class A. Trelleborg Medical Solutions provides design, development, and manufacturing services to medical device OEMs worldwide, operating multiple facilities in the United States, Germany, China, and Malta, with a new site in Costa Rica set to open soon.

https://www.plasticstoday.com/

Dow Launches INNATE TF 220 Resin for Recyclable, High-Performance BOPE Films

Dow has introduced INNATE TF 220 Resin, its latest material innovation engineered for recyclability and high-performance biaxially oriented polyethylene (BOPE) films used in flexible packaging. Developed with a focus on the circular economy, the resin combines advanced processing characteristics with end-use durability, enabling brand owners to meet both performance and sustainability goals. "Asia Pacific is where material science meets circular ambition," said Bambang Candra, Commercial

Vice President, APAC, Dow Packaging & Specialty Plastics. "Through breakthrough innovations like INNATE TF 220 resin—redefining recyclable packaging performance—and strategic partnerships across the value chain, we are accelerating the shift toward packaging circularity. This is sustainability in action, helping brands balance performance with scalability for mono-material solutions and post-consumer recycled content." Dow is already leveraging the material in collaboration with Chinese laundry detergent brand Liby, integrating 10% REVOLOOP post-consumer recycled (PCR) resin into the packaging of Liby's Floral Era detergent series. According to Zhang Liping, General Manager of Liby Research and Development Centre, "Our partnership with Dow has led to China's first fully recyclable laundry packaging using INNATE TF-BOPE, as well as the next-generation Floral Era packaging made with PCR resins. This long-term collaboration strengthens the sustainable value of our products and reflects our commitment to environmental stewardship and innovation." With a unique molecular architecture, INNATE TF 220 Resin delivers improved processing efficiency, extrusion stability, and biaxial stretching processability, reducing manufacturing waste. The resin also offers higher stiffness and heat resistance, meeting downstream requirements for printing, lamination, and bag-making. TF-BOPE films produced with the resin are suited to a variety of applications, particularly in food and beverage, home care, and personal care packaging. By designing INNATE TF 220 for recyclability, Dow has encouraged adoption across the packaging value chain, with converters and brand owners using TF-BOPE films to address evolving regional recycling regulations while enhancing packaging performance.

https://interplasinsights.com/

Amcor Expands PCR Packaging Capabilities at Kentucky Facility

Amcor has announced a significant investment in its Nicholasville, Kentucky plant to expand post-consumer recycled (PCR) packaging production. The upgrade enhances the site's ability to meet growing customer demand for packaging with recycled content, while supporting broader sustainability objectives. The facility now features a silo system that feeds multiple production lines, enabling precise PCR blending. This allows customers to select their preferred recycled content level—up to 100% PCR—for both custom and stock rigid packaging. The flexible system illustrates Amcor's ability to optimise manufacturing processes while increasing the use of recycled polymers. "Many brands are seeking packaging that not only protects and promotes products, but also aligns with their sustainability goals," said Greg Rosati, Vice President of Amcor Rigid Packaging North America. "This facility gives customers greater choice in the recycled content of their packaging and reinforces Amcor's commitment to a circular economy. While the investment was made to address the specific needs of our spirits customers, there is strong potential to serve other market segments as well." Amcor has made PCR integration a key part of its growth strategy. In fiscal year 2024, the company's rigid packaging division collaborated with customers to introduce more PCR-based packaging solutions to market, increasing its procurement of recycled polymers by over 50,000 metric tons compared to the previous year.

https://interplasinsights.com/

MOL Group Completes Next Stage of Sustainable Fuel Production Trials

MOL Group has successfully completed another stage of renewable fuel production testing at its Rijeka refinery, confirming the feasibility of producing hydrotreated vegetable oil (HVO) and sustainable aviation fuel (SAF) via co-processing with fossil feedstocks. The pilot project, conducted in cooperation with Chevron Lummus Global—supplier of the site's hydrocracking unit—involved blending 5% POME (Palm Oil Mill Effluent, a by-product of palm oil production) into the conventional feed. A total of 1,000 tonnes of biogenic component were processed under the supervision of independent auditor Bureau Veritas d.o.o., in accordance with ISCC standards. Due to the specific physical and chemical properties of the new feedstock, preparations for the trials took eight months. Over 400 samples were collected and analysed by INA's Central Testing Laboratory, while the biogenic content in final products was verified using carbon-14 isotope analysis at accredited external laboratories—Institut Ruđer Bošković in Zagreb and Isotoptech Zrt. in Debrecen. This follows earlier tests at MOL's Slovnaft refinery in Bratislava, which confirmed the technological readiness of the units and aligns with the company's Shape Tomorrow strategy as well as its long-standing co-processing activities at the Danube refinery in Hungary. Earlier this year, the Bratislava site successfully trialled HVO biodiesel production using cashew nut shell oil, while SAF production involved partially refined used cooking oil processed alongside conventional feedstock. These tests confirmed that facilities used for producing standard jet fuel can also manufacture SAF without major modifications. MOL has long applied co-processing at its Danube refinery, blending biogenic and fossil components directly within the production process to reduce the carbon footprint of conventional fuels without the need for separate production lines. In 2022, in partnership with Budapest Airport, Wizz Air, and Airport Fuel Supply, MOL launched commercial SAF production trials in Hungary, making SAF available in Hungary, Slovakia, and Croatia in volumes equivalent to 14,000 tonnes of biogenic content. "MOL already produces renewable diesel and sustainable aviation fuels from renewable feedstocks and is ready to expand production. We are strategically committed to sustainable mobility—on land and in the air. By building a comprehensive mobility offering, we aim to provide our customers with an ever-broader range of fuels,

enabling them to take smart steps in their energy transition," said Csaba Zsótér, Senior Vice President for Downstream Fuels at MOL Group. Sustainable aviation fuels can only be produced from renewable sources—such as plant-based feedstocks or waste—and must meet the same technical and environmental requirements as conventional jet fuel. Currently, only a limited number of refineries worldwide can produce SAF, and supply remains well below rising demand, which is reflected in market prices. MOL's strategic focus on this segment is designed to meet climate objectives while strengthening regional supply security.

https://www.plastech.pl/

Clariant Expands Stabiliser Production and Launches New Solutions for Artificial Turf and Medical Applications

Clariant has announced a major expansion of its plastics stabiliser portfolio, combining increased production capacity in China with the introduction of innovative solutions for demanding applications in artificial turf and the medical sector. The development responds to rapidly growing demand for advanced stabilisers in Asia and globally, particularly in the context of the fast-expanding Chinese polyamide industry. The company's joint venture with Beijing Tiangang Auxiliary Co., Ltd. has completed the chemical start-up of a second S-EED production line at its Cangzhou plant. The new line will focus on manufacturing Nylostab S-EED, a multifunctional stabiliser designed to meet the needs of the textile and engineering plastics industries. According to Clariant, this expansion will improve service efficiency for customers in China and across the wider Asian market. Nylostab S-EED has recently gained popularity in artificial turf applications, especially for sports fields. The stabiliser offers protection against light, heat, and oxidation—critical factors in maintaining the durability and appearance of polyamide-based turf systems. By improving UV resistance and tolerance to frequent cleaning, it extends the lifespan and colour retention of polyamide turf installations, making them more resilient to heavy use and harsh weather. Developed using molecular recognition techniques, Nylostab S-EED demonstrates excellent solubility in polyamide and strong affinity for polyamide chains, resulting in enhanced durability and performance. In parallel, Clariant has introduced AddWorks LXR 548, a non-phenolic antioxidant solution for polyolefin-based plastics. Specifically designed to reduce yellowing in polyolefin components, it ensures colour stability even after gamma irradiation and thermal processing. The formulation meets the industry's growing demand to eliminate phenolic antioxidants from sensitive applications such as medical and hygiene products, where regulatory compliance and product appearance are critical. Offering high compatibility and solubility in diverse polymer systems, low extractability, and a favourable toxicological profile, AddWorks LXR 548 is suitable for use in syringes, bottles, nonwovens, and other polyolefin components that must meet both stringent performance and safety standards. With the rising demand for medical-grade plastics, this innovation positions Clariant to capture a larger share of a high-value market segment. Through these investments and product developments, the company continues to strengthen its position as a supplier of specialty chemicals that enhance the performance and sustainability of plastics. Clariant remains committed to delivering targeted solutions to customer challenges, supporting the production of more durable, resource-efficient end products, and advancing quality, compliance, and sustainability across both mature and emerging markets.

https://www.plastech.pl/

Feddersen Group Wins German Packaging Award for Circular Packaging Innovation

K.D. Feddersen Holding GmbH, the parent company of the Feddersen Group, together with its project partners, has been honoured with the German Packaging Award in the "Sustainability – Use of Recyclates" category. The award recognises a joint project aimed at advancing the circular economy in the plastics and packaging industries. The initiative brought together the expertise of saperatec GmbH, supplier of post-consumer recycled (PCR) material; Palbo GmbH, container manufacturer; and AF-Color, the Feddersen Group's masterbatch specialist and a division of Akro-Plastic GmbH. The award-winning packaging solution features composite materials—specifically, a container made from 50% PCR polyethylene (PCR-PE) and 50% high-density polyethylene (HDPE). The PCR material is sourced from recycled beverage cartons, providing a practical outlet for a material stream that is often challenging to process. To achieve the desired visual appearance, AF-Color supplied PCR-based masterbatches in blue, black, and silver, ensuring that both functional and aesthetic requirements were met. According to the partners, the project demonstrates how high-quality packaging can be produced using significant proportions of recycled content, without compromising on performance or appearance. K.D. Feddersen Holding GmbH and its partners expressed their gratitude to the German Packaging Institute (Deutsches Verpackungsinstitut e.V.) for the recognition, viewing the award as a validation of their ongoing efforts to develop sustainable solutions for the plastics industry and to advance knowledge in circular economy practices. The winning project will be showcased at K 2025 on the Feddersen Group's joint stand (Hall 6/C76), offering an opportunity to present the innovative packaging solution to a broader audience and to highlight the potential of recycled materials in premium packaging applications.

https://www.plastech.pl/

M.Sc. Mateusz Borkowski

TECHNICAL NEWS

ENGEL Presents Foam Moulding Cell for Technical Recyclates

At the upcoming K 2025 trade fair, ENGEL will unveil an innovative approach to sustainable, space-efficient production, focusing on manufacturing robust technical parts entirely from post-consumer recycled (PCR) materials. The centrepiece of the company's exhibit will be the fully electric e-mac 220 injection moulding machine, producing thick-walled plastic components for the construction sector. This system has been designed for maximum material savings and energy efficiency, with a compact footprint suitable for integration into existing production lines. It employs ENGEL's foammelt technology, which introduces a foaming agent into the molten polymer to create a fine-celled foam structure. Combined with a specially developed additive blend, this method enables the production of lighter yet more impact-resistant parts. In the demonstrated application, the system achieves approximately a 30% mass reduction for a 538 g shot weight, while increasing impact resistance by around 10%. These mechanical properties make it possible to replace heavier materials, such as concrete, in construction applications, particularly in manhole components and other infrastructure elements. The recycled feedstock is sourced from Germany's "Gelber Sack" collection scheme, supplied by PreZero and reprocessed by EREMA. The foaming process uses an additive and foaming agent blend developed by Moxietec, enhanced with ExxonMobil's Vistamaxx. Precise dosing is ensured by Movacolor's gravimetric system, maintaining consistent material quality. Moxietec's formulation is particularly effective for thick-walled parts, overcoming the limitations of conventional foaming methods. Polymer homogenisation is handled by ENGEL's standard mixing screw, optimised for uniform melt distribution in foaming applications. A newly designed ring-type check valve with profiled wings and a short-stroke configuration improves repeatability and accelerates closure, eliminating the need for decompression after dosing and preventing sink marks or voids. The plasticising unit integrates ENGEL's iQ melt control digital assistant, which analyses the plastication process and recommends optimal screw speed, back pressure, and dosing stroke. This ensures consistently high part quality and maximises material efficiency, even with recycled feedstocks. A cold-runner system further supports the foaming process, with the two-cavity Moxietec mould achieving an average cycle time of 120 s. Temperature management is another key factor, particularly for thick-walled components. ENGEL's latest e-temp units operate with water at just 90 °C, eliminating the need for dedicated hot-water systems and reducing operational costs. The iQ flow control system dynamically monitors and adjusts temperature, immediately correcting deviations to ensure uniform cooling, minimise warpage, and improve dimensional accuracy. This translates to process stability and an energy savings of up to 85% for temperature control.The production cell has been designed for compactness and automation. A gripper removes the sprue, while the ENGEL viper 12 linear robot extracts the part from the mould and places it on a conveyor integrated into the machine's safety enclosure. All automation is fully integrated into the injection moulding machine's control system, and iQ motion control optimises motion sequences, further reducing cycle times and lowering energy consumption. "With this presentation, we are demonstrating how sustainable manufacturing, advanced foaming technology, and intelligent cell design—supported by digital assistance systems—can be combined into a practical and economically attractive solution for the plastics industry," says ENGEL. The system ensures a stable process for challenging recyclate applications, making it an ideal fit for compact production environments.

https://www.plastech.pl/

Feather-Light Polymer–Ceramic Composite Outperforms Steel in Thermal Conductivity

A research team at Northeastern University, in collaboration with the U.S. Army Research Laboratory, has developed a novel polymer–ceramic composite that combines the lightness of plastic with a thermal conductivity surpassing stainless steel—while maintaining electrical insulation and transparency to radio waves, including 5G signals. The breakthrough, announced in July 2025, is being commercialised through Fourier LLC, a spin-out supported by Northeastern's Center for Research Innovation (CRI), the Spark Fund, and defence contractor RTX (formerly Raytheon). According to Northeastern Global News ("Scientists Create Heat-Conductive Plastic To Optimize Electronics", 11 July 2025), the material is four times lighter than stainless steel, can be processed using conventional thermal forming or 3D printing, and "offers unprecedented heat management without interfering with high-frequency communications." The composite's internal structure resembles a meticulously ordered network of ceramic elements and crystalline polymer bridges. During precision 3D printing, ceramic particles are positioned with high accuracy; subsequent processing induces the formation of thermal channels akin to a ne-

twork of microscopic capillaries. As the research team emphasises, maintaining structural order down to the nanometre scale was crucial for creating what they call a "thermal highway," enabling rapid heat dissipation. This view is echoed by Physicists Organization Network, as cited by Webull News (16 July 2025), which described the material as having "a feather-like architecture with exceptional thermal conductivity." The composite's dielectric properties allow it to be placed directly adjacent to high-frequency components such as 5G antennas or radar systems. This eliminates the traditional design requirement to physically separate thermal management materials from signal-transmitting elements—a constraint that has historically complicated layouts and increased component mass. While still in the laboratory phase, scale-up efforts are underway. The CRI describes the innovation as part of the class of thermoformable ceramic matrix composites—engineered materials tailored for both thermal forming and additive manufacturing. Potential applications range from data centres—where cooling can account for up to 40% of total energy consumption (IEA)—to power electronics in electric vehicles, military and aerospace systems, and portable communications devices. In electric mobility, the composite's ability to rapidly dissipate heat without conducting electricity could prove transformative. Positioned near battery packs, it may mitigate the risk of thermal runaway—a dangerous chain reaction of heat build-up that can lead to spontaneous ignition.

https://tworzywa.online/

Carbon Fiber Boosts Performance of Li-ion Batteries

Oak Ridge National Laboratory (ORNL) researchers have overcome a barrier to using a more affordable, dry process for manufacturing the lithium-ion batteries used in vehicles and electronic devices. The resulting batteries provide greater electricity flow and reduced risk of overheating. The dry-processing method for making electrode films eliminates the need for wet organic solvents that require increased factory floor space, time, energy, waste disposal, and startup expenses. However, dry-processed films, typically extruded from polypropylene (PP) resin and biaxially-oriented, tear more easily than wet-processed films that are biaxially oriented using high-molecular-weight, high-density polyethylene (HMWPE). To overcome this mechanical deficiency, ORNL researchers incorporated long carbon fibers (CFs), then tested coin cell batteries made from the material. They found the films were stronger and more flexible. The long fibers improved the mechanical strength of the material while transferring electrons further for faster charging and discharging rates. Although they barely cover a fingertip, these carbon-fiber snippets are the longest to be incorporated into a battery separator film, allowing faster transfer of electrons. Image courtesy of Carlos Jones/ORNL, US Dept. of Energy. While others have experimented with nanoscale carbon fibers, ORNL is the first to use long carbon fibers, said scientist Jaswinder Sharma. The chemical cost savings would exceed the price of the fiber, which constitutes only 1% of the weight. "We think this is the next step in bringing dry-processed electrodes near to widespread use," he said. "By eliminating expensive solvents and simplifying manufacturing, this method could help US battery producers compete more effectively in the global market." The ORNL project is funded by the Department of Energy's Advanced Materials and Manufacturing Technologies Office. Separately, the US Department of Energy's Argonne National Laboratory and the University of Texas at Dallas (UT Dallas) signed a memorandum of understanding (MOU) to advance research in battery science and strengthen supply chains for critical materials. Argonne Laboratory Director Paul Kearns and Vice President for Research and Innovation at UT Dallas Joseph J. Pancrazio signed the MOU during a ceremony on Tuesday, July 22, at Argonne's Materials Engineering Research Facility (MERF) — a state-of-the-art facility that offers rapid scale-up from benchtop to pilot by bridging the gap between research and industry. The MERF will be a vital place for inter-institutional collaboration during the partnership.

https://www.plasticstoday.com/

Wacker's New Silicone Rubber Enhances Safety of High-Voltage EV Battery Systems

At the upcoming K 2025 International Trade Fair for Plastics and Rubber, Wacker will introduce Elastosil R 531/60, a high-performance silicone rubber engineered specifically for insulating busbars in high-voltage traction batteries used in electric vehicles (EVs). As battery system voltages in the automotive sector rise—from 400 V to beyond 900 V—the demand for reliable and durable electrical insulation is becoming increasingly critical. Busbars, typically made of aluminium or copper, serve as the primary conductors between battery cells and modules. Effective insulation prevents leakage currents, energy losses, and, most importantly, ensures passenger safety. Elastosil R 531/60 addresses these challenges by providing consistent insulation performance even under continuous operation at temperatures up to 205 °C. A defining feature of this material is its ceramisation capability in the event of a fire. When exposed to extreme heat, the cured silicone transforms into a solid ceramic layer, maintaining electrical insulation and preventing short circuits at temperatures between 800 °C and 1000 °C. This creates an additional safety barrier, protecting busbars during accidents or thermal events and significantly reducing the risk of catastrophic electrical failure. With a Shore A hardness of 60, the material can be efficiently extruded and applied as a coating on busbars, streamlining manufacturing and reducing costs. Its high elasticity and tear resistance allow insulated busbars to be bent and fitted into complex geometries inside battery packs

without cracking or delaminating. This mechanical integrity persists even after impact testing, and the insulation remains effective at temperatures down to −40 °C, ensuring robust protection against vibrations and shocks during vehicle operation. Fire safety is a key consideration in EV design, particularly given increasing battery voltages and energy densities. Wacker notes that the ceramisation property of Elastosil R 531/60 ensures that, even under uncontrolled temperature rise or fire conditions, busbars remain electrically insulated. This not only prevents short circuits but also helps contain the spread of fire within the battery enclosure, contributing to the overall safety of the vehicle. Wacker will showcase Elastosil R 531/60 at K 2025 in Düsseldorf, Germany, from 8–15 October, Hall 6, Booth A10. The company anticipates strong interest from automotive OEMs and suppliers seeking advanced solutions for EV battery safety and reliability.

https://www.plastech.pl/

Japan Steel Works Launches World's First 40,000 kN All-Electric Injection Moulding Machine

Japan Steel Works (JSW) has expanded its portfolio with the introduction of the world's first ultra-large all-electric injection moulding machine (e-IMM) offering a clamping force of 40,000 kN. This milestone development addresses the growing global demand for lightweight components, particularly in the automotive industry, where electric vehicles increasingly rely on large plastic exterior parts such as bumpers, tailgates, and battery enclosures. The technology also finds applications in agricultural and industrial machinery, household goods, and appliances, with strong potential in the U.S. market. Traditionally, the large-machine sector has been dominated by hydraulic systems, which consume substantial amounts of energy, produce variable part quality, and operate at slower cycle times due to inherent limitations in speed and acceleration. JSW's new all-electric system overcomes these challenges by delivering the fastest dry cycle in the industry—boosting productivity by around ten percent compared to the latest hydraulic models—while ensuring consistent part quality. The machine achieves this through a proprietary servo-electric drive and patented mechanism, supported by a rigid, long-life mechanical design. The newly launched J4000F-22000H is a two-platen machine with a clamping force of 4,000 metric tonnes (4,400 US tons) and a maximum shot volume of 22,000 cm^3, equivalent to approximately 18.6 kilograms of polypropylene. Despite its scale, the system is 12% shorter than comparable hydraulic machines, with an overall length of just 17.4 metres. It also delivers notable sustainability benefits: electricity consumption is reduced by 15–20%, cooling water demand by half, and hydraulic oil use by 70%, resulting in a 15–20% cut in annual CO_2 emissions and more than 20% lower operating costs. The high rigidity of the platen and clamping unit, combined with an efficient moving-platen support system, ensures precision and reliability over long service intervals. JSW's electric drive concept draws power only during active clamping or injection, making the machine suitable for cleanroom environments while minimising heat and noise emissions. The absence of hydraulic oil reduces contamination risks, and the use of air-cooled drives with OPC UA interfaces enhances both energy efficiency and connectivity. At the K 2025 trade fair (Hall 13, Booth B 77), JSW will present a comprehensive range of all-electric solutions, including blow-moulding and extrusion systems, alongside three J-Series injection moulding machines with clamping forces of 800 kN, 2,200 kN, and 6,500 kN. The J80ADS will demonstrate the production of a recycled ABS shielding panel with automated removal and inspection via SCARA and six-axis robots. The J220ADS will showcase two-component moulding using the FLiP auxiliary unit, while the J650ADS will highlight advancements in large all-electric machine design. "By introducing the J4000F-22000H, we are setting a new benchmark for size, precision, and sustainability in the injection moulding industry," a JSW representative stated. JSW's European operations are managed by JSW Plastics Machinery Europe, based in Warsaw, and supported by a network of 16 regional representatives. In Germany, KT-Sakkas has been a partner since 2007, offering sales, service, spare parts, and complete system design. The company's technical centre near Herzogenaurach allows customers to explore JSW's full-electric portfolio first-hand. Founded in 1907, JSW has delivered more than 80,000 injection moulding machines globally since 1961, introducing its first all-electric model in 1988 and continuing to push the boundaries of sustainable, high-precision plastics manufacturing.

https://www.plastech.pl/

M.Sc. Mateusz Borkowski

WYNALAZKI/INVENTIONS

Sposób wytwarzania nanokompozytu krzemowo-grafenowego, nanokompozyt krzemowo-grafenowy wytworzony tym sposobem i jego zastosowanie – Wioleta Ślubowska-Walkusz, Toms Slapjums, Anatoly Saprykin, Viktor Makotchenko (Zgłoszenie Nr 446787, Adianano PL Sp. z o.o., Poznań)

Przedmiotem zgłoszenia jest sposób wytwarzania nanokompozytu krzemowo-grafenowego przy zastosowaniu procesu eksfoliacji promieniowaniem mikrofalowym fluorowanego grafitu interkalowanego, charakteryzujący się tym, że fluorowany grafit interkalowany jest tetrachlorkiem węgla $C_2F'CCl_4$ w mieszaninie gazowej zawierającej argon i monosilan w stosunku 9:1 przy zastosowaniu ogrzewania promieniowaniem mikrofalowym do temperatury nie przekraczającej 250°C, po czym następuje rozkład monosilanu i jednoczesne osadzenie się nanocząstek krzemu na warstwach grafenu. Zgłoszenie obejmuje także nanokompozyt krzemowo-grafenowy wytworzony powyższym sposobem, zawierający nanoziarna krzemu w ilości 10–40% masy całkowitej kompozytu (wg Biul. Urz. Pat. 2025, nr 21, 12).

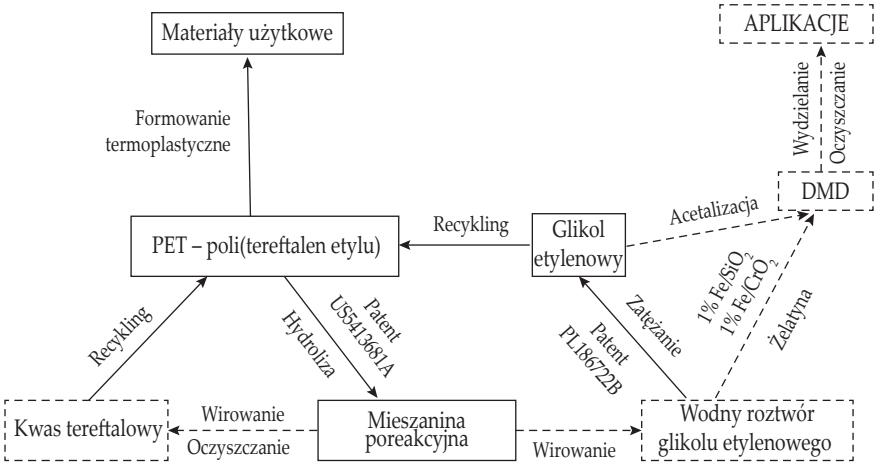
Sposób recyklingu rPET [recyklingowanego poli(tereftalanu etylenu)] do kwasu tereftalowego i/lub 2,2-dimetylo-1,3-dioksolanu (DMD) oraz katalizator syntezy pochodnych 1,3-dioksolanu z acetonu i glikolu etylenowego – Maciej Kapkowski, Sonia Kotowicz, Mateusz Korzec, Karina Kocot (Zgłoszenie Nr 446786, Uniwersytet Śląski w Katowicach)

Przedmiotem wynalazku jest sposób recyklingu rPET [recyklingowanego poli(tereftalanu etylenu)] do kwasu tereftalowego i/lub 2,2-dimetylo-1,3-dioksolanu (DMD) obejmujący etap obojętnej hydrolizy rPET w reaktorze ciśnieniowym w stosunku masowym woda do rPET odpowiednio od 30:40 do 40:10 prowadzonej w warunkach ciśnienia do 20 bar i temperatury w zakresie 150–250°C z szybkością mieszania do 400 obr./min, gdzie z produktów obojętnej hydrolizy rPET odsącza się kwas tereftalowy, który rozpuszcza się w wodnym roztworze wodorotlenku sodu o stężeniu 3–4% (korzystnie 3,85%) i dodaje się węgla aktywnego w ilości odpowiedniej do wychwytu zanieczyszczeń. Po odsączeniu węgla aktywnego dodanego na etapie a) dodaje się stężonego kwasu organicznego do uzyskania pH od 2 do 4 i sączy oczyszczony kwas tereftalowy z wydajnością wynoszącą co najmniej 92% o czystości co najmniej 98,0%. Przedmiotem wynalazku jest również katalizator syntezy pochodnych 1,3-dioksolanu z acetonu i glikolu etylenowego, który stanowi warstwę aktywną nanocząstek żelaza bądź chromu naniesioną na nośnik w postaci dwutlenku krzemu, przy czym stężenie nanocząstek w masie całego katalizatora wynosi 0,9–1,0% mas (korzystnie 0,910–0,983% mas.) i ma postać sypkiego proszku (wg Biul. Urz. Pat. 2025, nr 21, 14).

Kompozycja na bazie żywicy epoksydowej, o właściwościach przeciwstarzeniowych – Natalia Sienkiewicz, Dawid Szymborski (Zgłoszenie Nr 446774, Politechnika Łódzka)

Przedmiotem zgłoszenia jest kompozycja na bazie żywicy epoksydowej, o właściwościach przeciwstarzeniowych, przeznaczona zwłaszcza do zastosowania w polimerobetonach, która zawiera na 100 cz. mas. żywicy epoksydowej 12 cz. mas. utwardzacza oraz 10–30 cz. mas. ekstraktu wodnego z bazylii azjatyckiej, standaryzowanego na zawartość kwasu ursolowego w ilości 5% mas. (wg Biul. Urz. Pat. 2025, nr 21, 14).

Ciekła kompozycja powłokotwórcza przeznaczona zwłaszcza do wytwarzania powłok czasowo stabilizujących temperaturę – Jarosław Przybylski, Krystyna Sylwestrzak, Janusz Kozakiewicz, Witold Sarna, Izabela Ofat-Kawalec, Joanna Trzaskowska (Zgłoszenie



Nr 446831, Sieć Badawcza Łukasiewicz – Instytut Chemii Przemysłowej im. Prof. Ignacego Mościckiego, Warszawa)

Zgłoszenie dotyczy ciekłej kompozycji powłokotwórcza tworzącej na podłożu powlokę czasowo stabilizującą temperaturę, zawierającej dwukomponentowe spoiwo poliuretanowe, napełniacz zmiennofazowy (PCM) oraz ewentualnie inne typowe substancje pomocnicze stosowane w powłokach. Charakteryzuje się tym, że komponent A, w którym składnikiem reaktywnym jest oligowęglanodiol lub mieszanina oligowęglanodioli, zawiera 10–50% mas. proszku mikrokapsułkowanego PCM, a komponent B jest trimerem diizocyjanianu, przy czym stosunek masowy komponentu A do komponentu B wynosi 0,75–2,40. (wg Biul. Urz. Pat. 2025, nr 21, 14).

Sposób wytwarzania dodatku do mieszanek mineralno-asfaltowych i mieszanka mineralno-asfaltowa zawierająca dodatek wytworzony tym sposobem – Przemysław Zaprzalski, Witalij Zankowicz (Zgłoszenie Nr 446828, Recykl S.A. Organizacja Odzysku, Śrem)

Przedmiotem zgłoszenia jest sposób wytwarzania dodatku ze zużytych opon do mieszanek mineralno-asfaltowych, obejmujący następujące etapy: a) zużyte opony rozdrabnia się, a włókno syntetyczne oddziela się od frakcji gumowej, uzyskując wsad w postaci mieszaniny włókien syntetycznych; b) mieszaninę włókien syntetycznych poddaje się kondycjonowaniu, podczas którego mieszaninę podgrzewa się do temp. 40–120°C, zagęszcza się poddając działaniu ciśnienia 100–150 barów i nawilża się do poziomu wilgotności 1–10%, uzyskując mieszaninę o gęstości nasypowej 150–300 kg/m^3; c) mieszaninę poddaje się podgrzewaniu do maksymalnie 140°C i granulacji w granulatorze z matrycą o średnicy kanałów 2–12 mm przy stopniu sprężania 5–10, uzyskując granulki o gęstości nasypowej 300–600 kg/m^3. Przedmiotem zgłoszenia jest także mieszanka mineralno-asfaltowa zawierająca wyżej opisany dodatek w ilości 0,1–2% masy części mineralnej mieszanki mineralno-asfaltowej (wg Biul. Urz. Pat. 2025, nr 21, 15).

Sposób otrzymywania nanostrukturyzowanego materiału włóknistego i nanostrukturyzowany materiał włóknisty – Julia Radwan-Pragłowska, Łukasz Janus, Marek Piątkowski, Aleksandra Sierakowska (Zgłoszenie Nr 446803, Politechnika Krakowska)

Wynalazek dotyczy sposobu otrzymywania nanostrukturyzowanego materiału włóknistego, w którym to sposobie kwas bursztynowy poddaje się polikondensacji z glikolem w polu promieniowania mikrofalowego, a następnie prowadzi się reakcję szczepienia barwnikiem fluorescencyjnym. Fluorescencyjny oligoester kwasu bursztynowego rozpuszcza się wraz z polimerem i substancją bioaktywną w wysoko lotnym rozpuszczalniku. Tak przygotowany roztwór poddaje się elektroprzędzeniu, po czym uzyskany materiał włóknisty suszy się. Wynalazek dotyczy także nanostrukturyzowanego materiału włóknistego uzyskanego tym sposobem (wg Biul. Urz. Pat. 2025, nr 21, 16).

Materiał termoplastyczny zawierający środki zapachowe i zastosowanie środków zapachowych – Katarzyna Pokwicka-Croucher (Zgłoszenie Nr 446898, Pokwicka-Croucher Katarzyna, Gdańsk)

Przedmiotem zgłoszenia jest materiał termoplastyczny zawierający miał gumowy SBR otrzymywany w procesie rozdrobnienia opon samochodowych oraz pożytkową poliolefinę, charakteryzujący się tym, że zawiera miał gumowy SBR o frakcji w zakresie 0,01–1 mm i pożytkową poliolefinę o średnicy cząstek 4,5–5 mm, w stosunku masowym ilości poliolefiny do ilości miału gumowego jak 9:1 do 7:3, oraz tym, że zwiera środki zapachowe w ilości masowej względem mieszanki miału gumowego i poliolefiny jak 1,5–2,5:100. Przedmiotem wynalazku jest również zastosowanie środków zapachowych do polepszania właściwości mechanicznych materiałów termoplastycznych (wg Biul. Urz. Pat. 2025, nr 22, 19).

Sposób otrzymywania nawozu azotowego z dodatkami – Tomasz Krawczyński, Weronika Paliga, Roman Maszerowski, Eugeniusz Dbaj, Konrad Żak, Andrzej Kapusta, Piotr Stańczyk (Zgłoszenie Nr 447023, Grupa Azoty Zakłady Azotowe Kędzierzyn S.A., Kędzierzyn-Koźle)

Przedmiotem wynalazku jest sposób otrzymywania nawozów azotowych z dodatkami, metodą granulacji mechanicznej, charakteryzujący się tym, że do granulatora dwuwałowego w temperaturze 95–105°C wprowadza się: stop azotanu amonu i siarczanu amonu o łącznym stężeniu soli 93,0–95,5% mas. w ilości 0,73–0,80% mas. i co najmniej jeden dodatek spośród: zmielony minerał ilasty z grupy montmorylonitowej w ilości 0,10–0,30 cz. mas. i/lub siarczan potasu w ilości 0,05–0,30 cz. mas. i/lub siarczan magnezu jednowodny w ilości 0,05–0,30 cz. mas. Następnie po procesie zmieszania uzyskane granule nawozowe suszy się oraz klasyfikuje celem wyodrębnienia frakcji 2–5 mm, przy czym granule o niepożądanych frakcjach zawraca się do procesu granulacji, a gotowy produkt poddawany jest kondycjonowaniu oraz sezonowaniu (wg Biul. Urz. Pat. 2025, nr 23, 13).

Kompozycja na bazie poli(alkoholu winylowego) oraz sposób otrzymywania folii z użyciem takiej kompozycji – Katarzyna Łęczycka-Wilk, Brian Kaczmarczyk, Karolina Rolińska, Małgorzata Żmieńko (Zgłoszenie Nr 446759, Sieć Badawcza Łukasiewicz - Instytut Chemii Przemysłowej im. Prof. Ignacego Mościckiego, Warszawa)

Zgłoszenie dotyczy kompozycji na bazie poli(alkoholu winylowego) (PVA) plastyfikowanej mieszaniną głęboko eutektyczną (DES), w postaci chlorku choliny i kwasu organicznego, która zawiera 20–60% mas. mieszaniny głęboko eutektycznej, otrzymanej przez zmieszanie i ogrzewanie temp. 50–100°C i chlorku choliny i kwasu malonowego, kwasu glutarowego lub kwasu cytrynowego, w stosunku molowym 1:1, 40–80% mas. roztworu PVA w wodzie oraz 20–80% mas. w stosunku do suma-

rycznej ilości PVA i DES wodno-etanolowego ekstraktu z suszonych skorek owoców. Przedmiotem zgłoszenia jest również sposób otrzymywania folii PVA plastyfikowanej mieszaniną głęboko eutektyczną (DES), w postaci chlorku choliny i kwasu organicznego, charakteryzujący się tym, że do 20–60% mas. mieszaniny głęboko eutektycznej, otrzymanej przez zmieszanie i ogrzewanie w temp. 50–100°C chlorku choliny i kwasu malonowego, kwasu glutarowego lub kwasu cytrynowego w stosunku molowym 1:1, dodaje się 40–80% mas. roztworu PVA w wodzie, a następnie wodno-etanolowy ekstrakt z suszonych skorek owoców w ilości 20–80% mas. w stosunku do sumarycznej ilości PVA i DES, miesza się składniki kompozycji w temperaturze pokojowej do uzyskania jednorodnej cieczy, po czym wylewa się na płaską powierzchnię i suszy do odparowania rozpuszczalnika. Otrzymana kompozycja stanowi biodegradowalny materiał folio- i powłokotwórczy o ulepszonych właściwościach wytrzymałościowych i higienizujących, przeznaczony do zastosowania w przemyśle opakowaniowym (wg Biul. Urz. Pat. 2025, nr 23, 15).

Materiał kompozytowy i sposób jego otrzymywania – Jerzy Korol, Mariusz Szot (Zgłoszenie Nr 450876, Główny Instytut Górnictwa – Państwowy Instytut Badawczy, Katowice)

Przedmiotem zgłoszenia jest materiał kompozytowy charakteryzujący się tym, że składa się z osnowy aluminiowej oraz wypełniacza w postaci szkła spienionego w formie granul o średnicy 3–100 mm i porowatości 80–95%, gdzie osnowa aluminiowa wypełnia puste przestrzenie między granulami ze szkła spiekanego. Zgłoszenie obejmuje także sposób otrzymywania materiału kompozytowego charakteryzujący się tym, że przebiega dwuetapowo, przy czym w pierwszym etapie stłuczka szklana jest kruszona i mielona, aż do uzyskania materiału o uziarnieniu D90 = 60 μm, a następnie mieszana z gliceryną w ilości 1–5% mas. i szkłem wodnym w ilości 30–40% mas. w mieszalniku, po czym jednorodna masa poddawana jest procesowi granulacji w granulatorze, aż do uzyskania granul o średnicy 1–3 mm, a w drugim etapie granulaty są umieszczane w piecu rurowym, gdzie poddawane są najpierw osuszaniu w temp. 100–140°C, a następnie spiekaniu w temp. 800–820°C (wg Biul. Urz. Pat. 2025, nr 23, 16).

Sposób wytwarzania produktów z tworzyw sztucznych – Mariusz Grzegorz Kałek (Zgłoszenie Nr 447098, KAEM Sp. z o.o., Baranowo)

Wynalazek dotyczy sposobu wytwarzania produktów z tworzyw polimerowych, w którym stosowana może być przede wszystkim metoda wtrysku, zaś wytwarzane produkty, to lekkie wyroby o niewielkich gabarytach bądź główne funkcjonalne elementy takich wyrobów. Sposób polega na tym, że wytwarzane są produkty, jako lekkie wyroby o niewielkich gabarytach bądź główne funkcjonalne elementy takich wyrobów, a wytwarzanie następuje z co najmniej jednego tworzywowego granulatu kompozytowego, który jest choćby w części biodegradowalny, zaś granulat zawiera co najmniej jeden wypełniacz organiczny, w postaci łusek, mączki bądź włókien. Granulat uplastycznia się w temp. 160–190°C oraz formuje się go w dedykowanej dla niego formie, stanowiącej patrycę, w produkt. Proces prowadzi się przy użyciu dwóch granulatów, z których jeden będący granulatem polipropylenu stanowi 60–80 cz. mas. mieszaniny granulatów, a drugi stanowi 20–40 cz. mas. mieszaniny granulatów, będąc granulatem kompozytowym zawierającym włókna drzewne w ilości do 25 cz. mas. i łuski palonej kawy w ilości do 15 cz. mas.. Jako produkt wytwarzany w schłodzonej do temperatury nie większej niż 80°C formie, wytwarza się drobne narzędzia, bądź przybory budowlane, w szczególności malarskie (wg Biul. Urz. Pat. 2025, nr 24, 13).

Włókna z polilaktydu wytwarzane metodą stopową, o przyspieszonej biodegradowalności i polepszonych właściwościach wytrzymałościowych oraz sposób ich wytwarzania – Karolina Gzyra-Jagieła, Konrad Sulak, Zbigniew Draczyński, Longina Madej-Kiełbik, Sławomir Kęska, Piotr Cichacz (Zgłoszenie Nr 447047, Politechnika Łódzka, Sieć Badawcza Łukasiewicz - Łódzki Instytut Technologiczny)

Przedmiotem zgłoszenia są włókna z polilaktydu wytwarzane metodą stopową, o przyspieszonej biogradowalności i polepszonych właściwościach wytrzymałościowych, oprócz polimeru włóknotworczego, które zawierają dodatek modyfikatora w postaci cytrynianu trietylu lub adypinianu bis(2-etyloheksylu). Zgłoszenie zawiera także sposób wytwarzania metodą stopową włókien z polilaktydu opisanych powyżej, z wykorzystaniem procesów suszenia polilaktydu, przędzenia włókien z polilaktydu przy użyciu przędzarki wyposażonej w ekstruder, w którym następuje stopienie polilaktydu, oraz w głowicę, w której następuje przetłaczanie stopionego polilaktydu przez otwory filiery czyli formowanie włókien. Następnie rozciąga się otrzymane włókna z wykorzystaniem oddzielnego, niezależnego urządzenia, polegajace na tym, że przed procesem przędzenia, polilaktyd w stanie plastycznym miesza się z cytrynianem trietylu lub adypinianem bis(2-etyloheksylu), w wytłaczarce korzystnie w temp.160–220°C, po czym otrzymane żyłki modyfikowanego polilaktydu schładza się w wodzie, suszy do stałej masy w temp. 35°C pod obniżonym ciśnieniem i poddaje przędzeniu w strefie grzewczej ekstrudera o temp. 140–180°C, przy temperaturze głowicy 190°C, przy wydajności tłoczenia 28,5 g/min i szybkości odbioru włókien 900 m/min. Proces rozciągania surowych włókien prowadzi się korzystnie przy krotności rozciągu 2,80–3,28 w temp. 60–120°C (wg Biul. Urz. Pat. 2025, nr 24, 13).

mgr inż. Małgorzata Choroś

NOWE KSIĄŻKI

RUBBER MATERIALS
Fundamentals, Sustainability, and Applications
Editors: Marianella Hernández Santana, Saul Utrera-Barrios (Elsevier)
1st edition, 2025, 688 pages, 228.99 EUR
ISBN 9780443289897
ISBN 9780443289903 (e-Book)

The publication provides a fresh perspective on the potential of rubber materials in the 21st century when our global society faces unprecedented challenges related to resource consumption, waste management, and environmental impact. The book begins with an overview of the foundation of rubber science, covering fundamental principles, recent advancements, and future challenges. Sections discuss sustainability aspects and emerging trends within elastomer science and technology, all within the context of the 7Rs of the circular economy. Finally, the book presents advanced sustainable applications of rubber materials in diverse fields, including robotics, healthcare, energy, and more. This book serves as a valuable reference to materials scientists, industrial and academic researchers, and R&D professionals seeking to explore sustainable solutions in the realm of rubbers and elastomers, including their green applications.

ADDITIVE MANUFACTURING OF BIOMATERIALS AND THEIR BEHAVIOR
From Fundamentals to Applications
Editors: S. Renold Elsen, Arunkumar Palaniappan, Geetha Manivasagam (Elsevier)
1st edition, 2025, 500 pages, 243.99 EUR
ISBN 9780443338892
ISBN 9780443338908 (e-Book)

Authors of this publication delves into the cutting-edge advancements and revolutionary potential of this technology. The book provides readers with a comprehensive understanding of the principles behind additive manufacturing, the latest innovations, and its practical applications in biomaterials. This essential resource bridges the gap between fundamental knowledge and real-world uses, creating a solid foundation for researchers, professionals, and students alike. This work is a vital guide for those looking to stay at the forefront of advancements in biomaterials and their applications. In addition to its detailed exploration of additive manufacturing technologies, the book features case studies that illustrate specialized topics and practical applications. It equips readers with the essential knowledge required to design, fabricate, and test biomaterials for diverse purposes, from patient care to research. Highlighting its versatility, the book underscores how additive manufacturing is reshaping traditional production methods, fostering innovation, and opening new possibilities across the biomaterials industry.

BIORESORBABLE MATERIALS AND BIOACTIVE SURFACE COATINGS
Biomedical Implants and Tissue Regeneration
Editors: Anoushka Khanna, Navneet Sharma, Bhupendra Singh Butola, Harpal Singh (Elsevier)
1st edition, 2025, 500 pages, 243.99 EUR
ISBN 9780443316067
ISBN 9780443316074 (e-Book)

This book provides a detailed review of biomaterials specially designed for use in biomedical implants, tissue repair, and regeneration. A wide range of resorbable materials are covered, including polymers, bioceramics, metallic alloys, and dissolvable electronics, as well as their properties, degradation kinetics, and potential clinical uses. The book also explores bioactive surface modifications, highlighting their importance in enhancing the functionality of bioresorbable materials. Various coatings and surface modifications are covered, such as bioactive ceramic coatings, biofunctional polymer coatings, and surface modifications for enhanced osseointegration, cardiovascular applications, and neural interfaces. Additionally, regulatory guidelines for bioresorbable medical devices, ethical considerations, and environmental implications are analyzed.

NANOSTRUCTURED CARBON MATERIALS FROM PLANT EXTRACTS
Synthesis, Characterization, and Applications
Editors: Sreeraj Gopi, Aryamol K. S., Sabu Thomas, Jozef T. Haponiuk, Hanna J. Maria (Elsevier)
1st edition, 2025, 750 pages, 230.00 EUR
ISBN 9780323951265
ISBN 9780323951272 (e-Book)

The book guides the reader through the preparation and utilization of carbon nanomaterials based on various biomass sources, including fruits, vegetables, leaves, pulp and other plant extracts. The book covers the fundamentals of nanostructured carbon materials and synthesis methods from a range of plant sources. Other chapters focus on characterization, analysis, simulation and modeling in order to prepare plant extract based carbon nanomaterials with the required properties. Final sections highlight key application areas, presenting methods and approaches to prepare these materials for specific uses. This book will be of interest to researchers and advanced students across nanomaterials, polymer science, composite science, sustainable materials, chemistry, chemical

engineering, and materials science, as well as industrial scientists, engineers, and R&D professionals with an interest in sustainable carbon nanomaterials.

DESIGN OF FUNCTIONAL POLYMER NANOCOMPOSITES

Interface and Interphase Reactions, Compatibilization and Bond Behavior, and Functionalization Procedures

Editors: Rotimi Sadiku, Adrian P Mouritz, Costas Soutis, Suresh G Advani, Oluranti Agboola, Kokkarachedu Varaprasad, Bodo Fiedler, Mapula Lucey Mavhungu, Leif Asp, Yuris A. Dzenis, Chun Hui Wang, Costas Soutis (Elsevier)

1st edition, 2025, 556 pages, 237.99 EUR

ISBN 9780443248542

ISBN 9780443248559 (e-Book)

This publication reviews the latest developments in this fast-moving research field. The book discusses interface and interphase interactions in polymer nanocomposites, as well as compatibilization behavior and different functionalization procedures. It illustrates how each of these essential tools can be used in the design of new polymer nanocomposites for a broad range of different industrial-scale applications. In the research and development of polymer nanocomposites, the interface and interphase reactions of different constituents is extremely important. They play a vital role in introducing additional features and in the final resultant properties of the nanocomposite. In addition, final properties are also dependent upon the bond behavior and the reaction and interface created between the two constituents.

SUSTAINABLE ADDITIVES IN POLYMER TECHNOLOGY

Editors: Henri Vahabi, Mohammad Reza Saeb (Elsevier)

1st edition, 2025, 374 pages, 223.99 EUR

ISBN 9780443238062

ISBN 9780443238079 (e-Book)

Authors of this book provides a comprehensive guide to bio-based additives for polymers, balancing both fundamental and advanced information. The book aims to offer practical guidance for researchers and industry professionals on selecting, ranking, formulating, and applying these additives in polymer manufacturing. Each additive's role in the industry and its mechanisms of action are thoroughly covered, offering readers a complete understanding of their applications. The book is divided into several parts: an overview of bio-based additives, industrial and research developments, classification of materials, advantages and challenges, as well as the mechanisms of performance. It also delves into the economic aspects and commercial grades of each additive family, concluding with future research directions and developments.

HYDROGEL TISSUE ANALOGUES

Editors: Rangasamy Jayakumar, Arun Kumar Rajendran (Elsevier)

1st edition, 2025, 586 pages, 243.99 EUR

ISBN 9780443292606

ISBN 9780443292613 (e-Book)

This book provides an overview of the critical role of novel hydrogels in tissue engineering and biomedicine. Structured into three parts, this book guides readers through the latest advances in hydrogel technology. Part one offers an in-depth look at state-of-the-art hydrogel processing, including biomimetic strategies and ground-breaking bioprinting approaches. It also covers rheological characterization and its biomedical applications. Part two showcases the diverse applications of hydrogels in tissue regeneration, spanning bone, adipose, cartilage, cardiac, intervertebral disc, and skin tissues. Additionally, it explores hydrogels for hemostasis, vascularization enhancement, and infectious disease treatment, along with their bioadhesive properties. Part three delves into the regulatory aspects surrounding hydrogel products, addressing emerging developments and commercially available solutions. The publication is an essential resource for researchers and academics in the fields of materials science, biomaterials, polymer science, and regenerative medicine, who have an interest in hydrogel-based biomedical solutions.

PHYSICOCHEMICAL PROPERTIES OF CHITOSAN-BASED MATERIALS IN MULTIPLE PHASES

From Fundamentals to Biomedical, Pharmaceutical and Environmental Applications

Editors: Emilia Szymańska, Giuseppe Cavallaro (Elsevier)

1st edition, 2025, 390 pages, 186.99 EUR

ISBN 9780443221514

ISBN 9780443221521 (e-Book)

This book provides a comprehensive overview of structure diversity and versatile properties of chitosan while also summarizing the latest advancements and current applications of chitosan-based materials that are suitable for various purposes within pharmaceutics, biomedicine, chemical engineering, and environmental sciences. The book explores the complex nature between chitosan structure and its biological activity and describes strategies of polymer modification in order to tailor its physicochemical and mechanical properties. The utilization potential of chitosan for the fabrication of functional biomaterials in either liquid, semi-solid, or solid-state different phases (aqueous mixtures, hydrogels, solid films) is also covered. Finally, the key factors important to obtain chitosan materials suitable for biomedical applications and the characteristics of hybrid materials formed by chitosan and other components, including surfactants, polyelectrolytes, inorganic nanoparticles, are discussed.

FUNCTIONAL COMPOSITES: ROLE IN MODERN ENGINEERING

Editors: Sandip Kunar, Pranav Charkha, Santosh Jaju, Harish Tiwari (Wiley)

1st edition, 2025, 272 pages, 166.70 EUR

ISBN 9781394242009

ISBN 9781394242016 (e-Book)

The book is essential for anyone looking to deepen their understanding of advanced composite materials and their intricate behaviors, offering comprehensive insights into the mechanics, design, and innovative applications of functional composites in today's engineering landscape. Understanding the complicated vibration behavior of composite beams, plates, shells, curved membranes, rings, and other complex structures is crucial for modern-day engineering. The publication addresses current progress in the mechanics and design of functional composites and structures. It covers the characterization of properties, analyses, and design of various advanced composite material systems with an emphasis on coupled mechanical and non-mechanical behaviors. The book comprehensively covers analyses of functional materials related to piezoelectric and magnetostrictive nanocomposites, as well as the design of active fiber composites. Techniques and challenges in producing functional composites and identifying their coupled properties are also discussed. The book culminates in a discussion on more advanced uses of functional composites and how these smart structures can be analyzed on a larger scale. The book's comprehensive coverage of the innovative potential of these composites makes it an essential resource for industry professionals and students alike. This book is an ideal source of informations for materials scientists, mechanical, manufacturing, biomedical, and industrial engineers in industry and academia, as well as students, who are working with functional composites.

FLUOROPOLYMERIC MEMBRANES
Fundamentals, Fabrication, and Applications

Zhaoliang Cui, Enrico Drioli, Francesca Macedonio, Young Moo Lee (Wiley)

1st edition, 2025, 320 pages, 124.99 EUR

ISBN 9783527347520

ISBN 9783527826568 (e-Book)

This book comprehensively and systematically covers the basic science and technology of fluoropolymeric membranes, which have high mechanical strength and excellent chemical stability and thus have been employed for the last several decades as materials for membrane separation processes in a variety of applications. Written by four highly qualified authors, publication includes information on typical fluoropolymers like poly(vinylidene fluoride), poly(tetrafluoroethylene), and poly(ethylene chlorotrifluoroethylene), structure and properties of fluoropolymeric membranes, and fabrication strategies of advanced fluoropolymeric membranes, fluoropolymeric membranes novel applications in chemical- and bio-separations, hybrid systems, energy, fuel cells, batteries, gas and air treatments, and more. Also, how fluoropolymeric membranes support common water treatment processes, such as ultrafiltration, microfiltration, MBR membrane processes. Readers can find information's about new membrane operations such as membrane distillation, membrane crystallization, membrane emulsification, and membrane contactors. Providing complete coverage on the subject, this book is an essential resource for polymer chemists, membrane scientists, process engineers, materials scientists, water chemists, environmental chemists, and chemists in industry.

SUSTAINABLE SMART COMPOSITES
Technology, and Applications

Editors: Hiral Parikh, Piyush P. Gohil (CRC Press)

1st edition, 2025, 232 pages, 63.99 EUR

ISBN 9781032863771

ISBN 9781003527275 (e-Book)

The book discusses cutting-edge technologies, advancements in processing techniques, and real-world applications of composite materials in diverse fields such as structural engineering, aerospace, automobiles, and defense. It further covers important topics such as the design and development of green composites and optimizing the mechanical properties of composite materials. This book discusses the use of fiber-reinforced polymer matrix composite materials and artificial intelligence in the development of sustainable composites. It also presents state-of-the-art methodologies such as fused filament 3D printing and stereolithography to produce composite materials. Authors concentrated on the diverse equipment employed to assess the behavior of materials, with emphasis on the use of the latest cutting-edge optimization techniques, such as artificial intelligence, to forecast the behavior of the materials. It also introduces a range of material and operational parameters that impact strength to predict the mechanical properties of the developed materials. This publication showcases a comprehensive examination of the prospective utilization of composite materials in lieu of traditional substances for wind turbine blades. It is primarily written for senior undergraduates, graduate students, and academic researchers in fields including industrial and production engineering, manufacturing engineering, materials science, mechanical engineering, aerospace engineering, and automobile engineering.

Ms.C. Mateusz Borkowski