WITRYNA

OBRONY PRAC DOKTORSKICH

Dr Piotr Maćczak – *absolwent Wydziału Chemii Uniwersytetu Mikołaja Kopernika (UMK) w Toruniu. W 2024 r. ukończył studia doktorskie w ramach II edycji Doktoratów Wdrożeniowych realizowanych we współpracy Wydziału Chemii UMK w Toruniu z Przedsiębiorstwem Wodociągów i Kanalizacji (PWiK) Sp. z o.o. w Kutnie (gdzie jest zatrudniony na stanowisku starszego technologa). Praca doktorska została zrealizowana w Katedrze Chemii Biomedycznej i Polimerów, w dziedzinie nauki ścisłe i przyrodnicze, w dyscyplinie nauki chemiczne.*

Tytuł pracy doktorskiej: ***Zastosowanie flokulantów na bazie chitozanu i skrobi do oczyszczania wody technologicznej z płukania filtrów stosowanych w procesie uzdatniania wody podziemnej***

Promotor:

– prof. dr hab. Halina Kaczmarek (Uniwersytet Mikołaja Kopernika w Toruniu)

Recenzenci:

– dr hab. inż. Małgorzata Jaworska, prof. PW (Politechnika Warszawska)

– dr hab. inż. Joanna Jeż-Walkowiak, prof. PP (Politechnika Poznańska)

– dr hab. Przemysław Kosobucki, prof. PBŚ (Politechnika Bydgoska im. Jana i Jędrzeja Śniadeckich)

Data i miejsce obrony: 13 listopada 2024 r., Uniwersytet Mikołaja Kopernika w Toruniu, Wydział Chemii.

Celem rozprawy doktorskiej była synteza nowych bioflokulantów na bazie wybranych polisacharydów, ich charakterystyka fizykochemiczna oraz określenie skuteczności otrzymanych materiałów w oczyszczaniu wody technologicznej z płukania filtrów, zwanej popłuczną w Stacji Uzdatniania Wody (SUW) w Kutnie. Przedmiotem badań były następujące polisacharydy: chitozan (CT), skrobia kukurydziana (ST) oraz ich pochodne dialdehydowe (DCT, DST) i karboksymetylowe (CMC, CMS).

W pracy zaproponowano stosunkowo prostą metodę modyfikacji chemicznej wybranych polisacharydów przez wprowadzenie do ich struktury grup karbonylowych. W tym celu polimery poddano utlenianiu z użyciem jodanu (VII) sodu i karboksymetylacji, co spowodowało zmianę ich właściwości fizykochemicznych. Oczekiwanym efektem modyfikacji była poprawa właściwości adsorpcyjnych oraz związanych z nimi właściwości flokulacyjnych. Otrzymane pochodne DST, CMS, DCT i CMC, podobnie jak chitozan i skrobia są biodegradowalne, co ułatwia ich utylizację.

Skuteczność modyfikacji polisacharydów potwierdzono metodą spektroskopii osłabionego całkowitego odbicia w podczerwieni (ATR-FT-IR) i spektroskopii magnetycznego rezonansu jądrowego (^{13}C-NMR) oraz metodą analizy elementarnej. Za pomocą skaningowej mikroskopii elektronowej (SEM) zaobserwowano zmiany struktury, które miały istotny wpływ na właściwości flokulacyjne otrzymanych biopolimerów. Analiza termograwimetryczna (TGA) wykazała nieznaczną poprawę stabilności termicznej wynikającą z modyfikacji chitozanu i skrobi.

Potwierdzono potencjał aplikacyjny otrzymanych materiałów biopolimerowych w procesie oczyszczania wody popłucznej w Stacji Uzdatniania Wody w Kutnie. Ze względu na dużą zawartość związków żelaza, mających wpływ na zwiększenie zmętnienia oczyszczanej wody jako miarę skuteczności prowadzonego procesu przyjęto zmniejszenie zmętnienia i stężenia jonów żelaza. Efektywność flokulacyjną wyznaczono zgodnie z procedurą Jar Test. Najpierw określono optymalną dawkę syntetycznych flokulantów i na tej podstawie wykonano badania z użyciem otrzymanych biomateriałów. Uzyskano ponad 90% zmniejszenie badanych parametrów wody, co odpowiada wartościom uzyskanym dla handlowych flokulantów. Najwyższą efektywność flokulacyjną osiągnięto w przypadku karboksymetylowych pochodnych chitozanu i skrobi (CMS i CMC), które użyte w optymalnej dawce (0,2 mg/L) skutecznie usuwały jony żelaza (ok. 99%) i zmniejszały zmętnienie (98%).

Na podstawie analizy wyników zaproponowano mechanizm flokulacji, w którym istotną rolę odgrywają grupy funkcyjne (COOH, OH, NH_2) obecne w strukturze biopolimerów. Na podstawie pomiarów biochemicznego zapotrzebowania tlenu (BZT) potwierdzono biodegradowalność otrzymanych bioflokulantów i powstających osadów poflokulacyjnych.

Dodatkową zaletą otrzymanych pochodnych polisacharydowych jest ich rozpuszczalność w wodzie w stężeniach stosowanych w procesie flokulacji w SUW w Kutnie (w przeciwieństwie do natywnych polimerów). Jest to spowodowane obecnością grup karbonylowych w strukturze makrocząsteczek.

Zaproponowane flokulanty – biodegradowalne i nietoksyczne biopolimery, stanowią odpowiedź na rosnącą potrzebę stosowania ekologicznych materiałów i metod oczyszczania wody, a jednocześnie alternatywę dla aktualnie stosowanych flokulantów poliakrylamidowych. Przedstawione w pracy wyniki badań, stanowiące test pilotażowy, mogą znaleźć zastosowanie w oczyszczaniu nie tylko wody popłucznej, ale również wody pitnej i ścieków komunalnych.

Z KRAJU / HOME NEWS

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 listopadzie 2024 r.

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

Artykuł	Średnia miesięczna w 2023 r.	Listopad 2024 r.	Razem I–XI 2024 r.	% I–XI 2024/ I–XI 2023
Węgiel kamienny	4 044 108	3 910 673	40 354 224	90,7
Węgiel brunatny	3 341 267	3 400 086	37 204 249	102,3
Ropa naftowa – wydobycie w kraju	54 015	55 890	547 167	93,0
Gaz ziemny – wydobycie w kraju (tys. m^3)	417 026	420 427	4 425 425	97,5
Etylen	25 017	21 264	319 806	114,2
Propylen	24 584	23 748	356 985	132,4
1,3-Butadien	4 124	4 026	47 540	106,3
Fenol	3 245	3 151	34 780	96,5
Izocyjaniany	175	202	2 735	138,6
ε-Kaprolaktam	7 581	8 242	95 320	114,8

Wg danych GUS.

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

Tworzywo polimerowe/polimer	Średnia miesięczna w 2023 r.	Listopad 2024 r.	Razem I–XI 2024 r.	% I–XI 2024/ I–XI 2023
Tworzywa polimerowe	237 521	236 247	2 929 028	110,6
Polietylen	22 580	27 047	285 093	116,5
Polimery styrenu	13 557	15 869	139 467	95,8
Poli(chlorek winylu) niezmieszany z innymi substancjami, w formach podstawowych	12 979	4 000	205 530	132,0
Poli(chlorek winylu) nieuplastyczniony, zmieszany z dowolną substancją, w formach podstawowych	3 351	2 793	37 394	98,7
Poli(chlorek winylu) uplastyczniony, zmieszany z dowolną substancją, w formach podstawowych	7 468	7 808	93 101	110,6
Poliacetale, w formach podstawowych	15	47	211	137,0
Glikole polietylenowe i alkohole polieterowe, w formach podstawowych	7 393	6 836	83 417	101,1
Żywice epoksydowe, w formach podstawowych	1 018	1 001	10 476	88,9
Poliwęglany	1 456	1 338	17 465	104,4
Żywice alkidowe, w formach podstawowych	1 849	1 375	24 382	115,3
Poliestry nienasycone, w formach podstawowych	8 048	7 701	86 392	106,6
Poliestry pozostałe	4 871	4 980	55 670	96,1
Polipropylen	22 139	17 273	288 452	120,1
Polimery octanu winylu w dyspersji wodnej	2 402	3 477	41 038	150,5
Poliamidy 6; 11; 12; 66; 69; 610; 612, w formach podstawowych	13 081	14 334	190 630	131,3
Aminoplasty	15 977	20 098	225 615	119,2
Poliuretany	2 419	1 848	18 863	100,4
Kauczuki syntetyczne	19 666	24 274	242 492	111,2

Wg danych GUS.

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

Wyrób	Jednostka	Średnia miesięczna w 2023 r.	Listopad 2024 r.	Razem I–XI 2024 r.	% I–XI 2024/ I–XI 2023
Wyroby z tworzyw polimerowych	tys. zł	7 085 620	–	–	–
Rury, przewody i węże sztywne z tworzyw polimerowych	t	2 756	27 518	309 661	99,3
w tym: rury, przewody i węże z polimerów etylenu	t	11 031	10 673	117 792	94,6
rury, przewody i węże z polimerów chlorku winylu	t	8 404	8 655	98 842	102,4
Wyposażenie z tworzyw polimerowych do rur i przewodów	t	4 225	4 109	48 940	103,9
Płyty, arkusze, folie, taśmy i pasy z polimerów etylenu, o grubości < 0,125 mm	t	45 569	51 999	582 637	115,2
Płyty, arkusze, folie, taśmy i pasy z polimerów propylenu, o grubości ≤ 0,10 mm	t	10 867	13 072	160 187	125,6
Płyty, arkusze, folie, taśmy i pasy z komórkowych polimerów styrenu	t	33 815	35 606	429 878	109,7
w tym: do zewnętrznego ocieplania ścian	t tys. m²	12 770 9 105	12 517 8 585	149 564 101 361	101,9 96,9
Worki i torby z polimerów etylenu i innych	t	245 945	28 163	301 668	109,3
Pudełka, skrzynki, klatki i podobne artykuły z tworzyw polimerowych	t	25 565	24 827	270 720	104,5
Pokrycia podłogowe (wykładziny), ścienne, sufitowe	t tys. m²	7 096 1 907	9 288 2 083	98 667 24 329	124,1 113,6
Drzwi, okna, ościeżnice drzwiowe	t tys. szt.	41 658 742	52 335 910	514 412 9 005	110,3 108,2
Okładziny ścienne, zewnętrzne	t tys. m²	313 117	262 92	3 382 1 206	95,8 92,4
Kleje na bazie żywic syntetycznych	t	1 385	9 337	69 072	269,6
Kleje poliuretanowe	t	1 382	1 681	16 905	106,4
Włókna chemiczne	t	2 652	2 936	32 217	108,4
Tkaniny kordowe (oponowe) z włókien syntetycznych	t tys. m²	1 194 3 808	1 109 3 530	15 019 47 475	111,1 110,2
Nici do szycia z włókien chemicznych	t	40	38	429	95,0

Wg danych GUS.

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

Wyrób	Jednostka	Średnia miesięczna w 2023 r.	Listopad 2024 r.	Razem I–XI 2024 r.	% I–XI 2024/ I–XI 2023
Wyroby z gumy, produkcja wytworzona	t	82 308	70 747	851 635	91,7
Opony i dętki z gumy; bieżnikowane i regenerowane opony z gumy	t tys. szt.	41 666 4 388	37 418 4 904	423 432 51 014	90,2 104,5
w tym: opony do samochodów osobowych	tys. szt.	2 353	2 425	25 125	94,8
opony do samochodów ciężarowych i autobusów	tys. szt.	272	276	2 704	93,8
opony do ciągników	tys. szt.	7	6	68	83,0
opony do maszyn rolniczych	tys. szt.	35	28	317	81,4
Przewody giętkie wzmocnione metalem	t	1 612	1 157	16 356	90,4
Taśmy przenośnikowe	t km	4 129 2 316	2 134 2 256	35 565 26 559	78,0 103,3

Wg danych GUS.

mgr inż. Małgorzata Choroś

Printed armchair by IVE LABS and the Azoty Compounding Group

Grupa Azoty Compounding has announced another application of its materials in additive technology. In collaboration with IVE LABS, a large-format chair was 3D printed using FGF (Fused Granulate Fabrication) technology. The chair was manufactured using the composite granulate Tarfuse® G PP GF30 BK, developed by the Grupa Azoty 3D Printing Materials Center. The applied Tarfuse® pellets are composite materials specifically designed for additive technologies, developed to enable large-format 3D printing. IVE LABS, a company based in Świętochłowice, Silesia, specializes in large-format 3D printing using granulates made entirely from recycled materials. Its activities focus on implementing sustainable solutions in the plastics processing industry. The latest announcement highlights the company's success – IVE LABS has become a finalist in the prestigious Plastics Recycling Awards 2025, confirming the innovativeness of its technologies and their importance for the development of a circular economy. The 3D-printed chair, created using modern technology, is not only evidence of the growing potential of 3D printing in industry but also an example of how innovative solutions can influence everyday design and user comfort. The precise manufacturing technology and advanced materials enable the creation of lightweight, durable, and original forms that combine functionality with aesthetics. FGF technology eliminates the need for traditional filaments, allowing direct printing from plastic granules. In this case, polypropylene reinforced with 30% glass fiber was used, giving the print high mechanical strength, chemical resistance, and good dimensional stability. This solution is being increasingly adopted in the furniture, automotive, and construction industries. 3D printing opens entirely new perspectives for producing plastic furniture. The use of additive technology allows for waste reduction and raw material optimization, aligning with global trends in sustainable development.

https://tworzywa.online/

Will the Ikea operator invest in recycling in Leszno?

Ingka Group, the main franchisee and operator of approximately 90% of Ikea stores worldwide, plans to invest around €1 billion in the development of recycling infrastructure. These funds, managed by Ingka Investments, will support companies operating in the circular economy, which, according to the company, is a key element of its sustainability strategy. In Poland, one of the beneficiaries of previous investments is Morssinkhof Rymoplast, a major plastics recycler that has been expanding its production capacity for years, partly thanks to its collaboration with Ingka. The company's plant in Leszno specializes in the recycling of PET bottles and polyethylene (LDPE) film. The high-quality secondary raw materials produced from these waste are used in packaging production, synthetic fibers, and various plastic products, supporting the local material circulation and reducing the demand for virgin resources. Recycling efforts are part of Ingka Group's broader strategy, which in recent years has also expanded into the second-hand market. Responding to the growing popularity of used furniture and home decor items, the company launched the "Ikea Preowned" platform. After a pilot phase in Madrid and Oslo, the platform is now expanding across Spain and Norway, with plans to cover all of Europe in the coming years. This initiative allows Ikea to maintain control over its product life cycle, extending their durability and promoting sustainable consumption patterns. Jesper Brodin, CEO of Ingka Group, emphasizes that the platform will enable the company to compete with global players like eBay while attracting new customers looking for eco-friendly solutions. Although specific details about new recycling investment projects have not been disclosed, the company continues to collaborate with partners from its "Circular Investments" portfolio, launched in 2017. An example is the Dutch company RetourMatras, which processes used mattresses, recovering polyurethane foam later used in the production of new products. The company currently recycles around 2.5 million mattresses per year, operating in the Netherlands, France, and the UK. In its statement, Ingka Group also highlights the need for stricter regulations to support the growth of the recycling sector. Peter van der Poel points out that Extended Producer Responsibility (EPR) and eco-design requirements could play a crucial role in increasing demand for recycled raw materials.

https://tworzywa.online/

Chance to keep the home appliance components Factory in Łódź

Beko Europe, one of the leading home appliance manufacturers, has signed a letter of intent with Mefa Group regarding the potential acquisition of a plastic components factory located in Łódź, Poland. This is an important step in the restructuring of the company's operations in Poland. Beko Europe's decision aligns with its previously announced production optimization plan. The company has already closed its Łódź-based cooker and dryer manufacturing plants, as well as its refrigerator factory in Wrocław. Moving forward, Beko's key operational centers in Poland will be concentrated in Radomsko and its Wrocław cooker factory, supported by the Łódź Shared Services Center. At the beginning of January, Beko Europe announced that it had found a potential investor for the Łódź plastic components factory – Mefa Group, a Turkish manufacturer specializing in the production of home appliance components. The company operates five production plants in Turkey, manufacturing products such as dishwasher and refrigerator baskets, oven racks, EPS packaging, and composite materials made of plastics

and rubber. The transaction is expected to be finalized within the next few weeks. This acquisition is crucial for the local job market, as it is expected to preserve approximately 250 jobs at the Łódź plant. The new owner, Mefa, will also continue supplying components to Beko, ensuring production continuity and strengthening business relations between the two companies. With its expertise in plastics processing and a wide range of industrial products, Mefa could play a significant role in the further development of the Łódź factory. This acquisition not only secures ongoing production but also creates opportunities for introducing new technological and product innovations. Amid the ongoing changes in the European home appliance sector, maintaining a strong production base in Poland is especially important. By acquiring the Łódź factory, Mefa could strengthen its presence in Central Europe while benefiting from local expertise in plastics processing. This transaction is yet another example that the Polish industrial market remains attractive to international investors, particularly those in the manufacturing sector. If the acquisition is successfully completed, the Łódź factory could become a key production hub for plastic components in the home appliance supply chain, benefiting both Beko and other industry players.

https://tworzywa.online/

Innovative paper developed in cooperation between scientists and industry

Paper with increased stiffness and opacity, environmentally friendly, and suitable for creating documents written in Braille, has been developed by materials scientists from the West Pomeranian University of Technology in Szczecin in cooperation with Arctic Paper Kostrzyn. The paper called Amber Terra was developed by a team of scientists under the supervision of Professor Ewa Mijowska, Head of the Department of Physical Chemistry and Nanomaterials at the Faculty of Chemical Technology and Engineering of the West Pomeranian University of Technology in Szczecin, and R&D experts from Arctic Paper Kostrzyn. The university announced the implementation of the project at the turn of the year. Amber Terra can be used to produce books, notebooks, and envelopes. The material can also be used to create documents written in dot script for the blind. Prof. Mijowska said in the interview with PAP, that paper for writing in Braille had to used better mechanical properties. She emphasized that the production of the new paper uses 10–15 percent less natural raw material (cellulose fibres) than in the case of conventional technologies. She also added, that on an industrial production scale, this is a huge profit. She explained that the 'smartness' of Amber Terra was consisted in the fact that cellulose fibre, the basic building block of paper, captured more fillers while maintaining the expected parameters, including grammage. The project 'Development and implementation of technology for the production of high-quality graphic papers with increased opacity and bending stiffness with reduced share of wood fibres using a polymer crosslinker' was recognized by the Polish National Centre for Research and Development. It was awarded nearly PLN 16.4 million in funding from European funds. The research team members also included Beata Zielińska, Phd, a professor at the West Pomeranian University of Technology, Karolina Wenelska, PhD, Klaudia Maślana, PhD, and Tomasz Kędzierski. Professor Ewa Mijowska emphasized that the new paper is being already manufactured on an industrial scale in a factory in Kostrzyn nad Odrą (Lubuskie).

https://scienceinpoland.pl/en

Azoty Grupa integrates logistics across the entire Capital Group

As part of the ongoing work, recommendations will also be developed regarding logistics-related companies within the Capital Group and the potential separation of logistics processes within the Group. The logistics integration action plan is scheduled for approval in Q3 2025. The concept of logistics integration has emerged from strategic initiatives carried out under the Azoty Business Program. In recent months, Grupa Azoty has emphasized the growing importance of logistics in its business operations. The company is focusing on optimizing port areas, particularly by establishing partnerships with firms involved in importing raw materials. Another key aspect is the railway infrastructure, which is being adapted to serve a broader range of customers rather than being used almost exclusively for the Group's internal needs. This shift is expected to create additional revenue streams from external logistics services. Additionally, Grupa Azoty is in a strong position to lead ammonia imports to Poland, as it owns the country's only maritime ammonia transshipment terminal. The Port of Police is of particular strategic importance, with ongoing projects aimed at expanding railway connections and opening the port to external customers. Among Grupa Azoty's logistics assets are Grupa Azoty Koltar (a railway subsidiary), seaports in Gdańsk, Gdynia, and Police, as well as an extensive logistics infrastructure across various companies within the Capital Group. The LHS transshipment terminal at Grupa Azoty Siarkopol also plays a key role in logistics operations. Recently, Grupa Azoty's Police signed an agreement to support the development of the Grupa Azoty Seaport in Police. This agreement, signed with regional and local authorities, covers over 300 plots of land spanning more than 460 hectares. The initiative aims to enhance the area's economic potential, make it more investor-friendly, and increase the region's competitiveness in the job market. Expected revenue growth will come from port transshipment services, leasing agreements, and increased local fees. In light of the increasing role of logistics in Grupa Azoty's strategy, it is also worth noting the €33 million funding awarded in October last year by the European Climate, Infrastructure, and Envi-

ronment Executive Agency. This investment, managed by the Police Seaport Authority, aims to improve port accessibility from both land and sea, while also boosting transshipment efficiency. The project is expected to be completed by Q1 2028.

https://www.plastech.pl/

Representatives of 32 organizations issue a joint appeal to the Prime Minister

Representatives from 32 organizations within the agri-food sector have jointly addressed the Prime Minister and key government officials, expressing serious concerns about the Extended Producer Responsibility (EPR) concept proposed by the Ministry of Climate and Environment. This model is intended to serve as the foundation for packaging waste management regulations in Poland. According to the organizations, the proposed system is detached from market realities and introduces a state monopoly based on fiscal and bureaucratic regulations, which contradicts the government's deregulation strategy aimed at enhancing Poland's economic competitiveness. The signatories argue that this model will negatively impact both agriculture and food processing, sectors responsible for introducing over 60% of packaging to the market. The role of food packaging and its associated costs are crucial for Polish consumers, affecting both food safety and quality as well as product pricing. The organizations criticize the proposed EPR system for resembling the Hungarian model, which is one of the most expensive and least environmentally effective solutions in Europe. They warn that implementing such a system in Poland would lead to rising food prices, primarily due to increased bureaucratic and fiscal burdens. The appeal also highlights that the Ministry's proposal imposes disproportionate costs on producers without guaranteeing a real improvement in the waste management system's efficiency. Industry representatives point out that the specific role of food packaging has been overlooked, along with many key recommendations from the sector. One of the main concerns is the lack of transparency in determining packaging fees and the absence of a clear connection between these fees and recycling efficiency, which could ultimately stagnate or even lower the levels of selective waste collection and recycling of food packaging. Another issue raised is the lack of cost control and effectiveness monitoring within the EPR system. At the same time, the agri-food sector would bear full responsibility for any potential fines imposed on Poland due to insufficient waste collection and recycling levels. This financial burden is considered unacceptable for the dairy sector and the broader food industry. Instead of supporting the development of a sustainable waste management system, the current EPR proposal is seen as a source of additional financial and administrative burdens on producers, leading to higher food prices and weakened economic stability in the agri-food sector. Given the geopolitical shifts affecting European and domestic food markets, such regulations could further deteriorate the already challenging situation for Polish farmers. The organizations are calling for the immediate suspension of work on the current proposal and for broad consultations with all stakeholders, particularly those from the agri-food sector. They stress the need for a new EPR model that ensures environmental efficiency, economic rationality, and protects food safety and quality while minimizing price increases for Polish consumers.

https://www.plastech.pl/

Jokey Group expands ISBM method in Kędzierzyn-Koźle

The Jokey Poland Sp. z o.o. plant in Kędzierzyn-Koźle is launching the production of a new PET packaging line using the ISBM (Injection Stretch Blow Molding) method. This technology enables the creation of lightweight, durable, and fully recyclable containers, primarily used in the food and pharmaceutical industries. The first products in the lineup are Jokey Blow Jars (JBJ), available in capacities ranging from 150 ml to 300 ml, along with matching closures. Jokey Group continues to expand its portfolio, adapting to the growing demands of the PET packaging market. Consumers are already familiar with ISBM-produced containers from ketchup bottles, soap dispensers, and dietary supplement packaging. This technology allows greater design flexibility, weight reduction, and improved material efficiency. Compared to traditional PET injection molding methods, the ISBM process enables material savings of up to 15%, making it a more environmentally friendly solution. The demand for PET packaging produced using ISBM technology is rapidly increasing worldwide. This is primarily due to the material's properties – it is lightweight, transparent, and fully recyclable. Growing consumer awareness of environmental issues drives the packaging industry toward solutions aligned with the principles of a circular economy. Jokey, as one of the leading manufacturers of plastic packaging, embraces this trend by maximizing the use of rPET. This post-consumer recycled material significantly reduces the company's carbon footprint. The Kędzierzyn-Koźle plant plays a key role in Jokey Group's development strategy in Central Europe. Its location ensures efficient logistics for both the Polish and neighboring markets. The introduction of ISBM technology into production in Poland marks another step toward innovation and sustainable development for the company.

https://tworzywa.online/

mgr Mateusz Borkowski

WORLD NEWS

PE is better for the environment than paper, glass and aluminium

Research conducted by scientists from Michigan State University has shown that polyethylene (PE) packaging may have a lower environmental impact than alternative materials such as paper, glass, aluminum, and steel. This is a significant finding in the context of the global debate on the future of packaging and environmental policies. The life cycle analysis (LCA) covered five applications of PE packaging: shrink films for multipacks, stretch films for pallets, large bulk bags, bottles for non-food liquids, and flexible food pouches. The study included products from the cosmetic, food, and industrial sectors, such as pet food packaging, shampoos, bottled water, and cosmetics. The results, published in the journal Science of the Total Environment, indicate that replacing traditional packaging materials with polyethylene can reduce greenhouse gas emissions (GWP) by an average of 70%. Furthermore, PE demonstrated lower energy consumption from fossil fuels, reduced use of mineral resources, and less water consumption. In 16 of the 19 cases compared, PE packaging showed a more favorable environmental footprint than alternative materials. The authors of the study suggest that these results may influence international negotiations on material policy, including shaping the provisions of the UN Global Treaty on Plastics. These discussions cover potential bans on single-use products and the development of Extended Producer Responsibility (EPR) systems. EPR programs, which require producers to participate in the collection and recycling of packaging waste, are already being implemented in several U.S. states, including California, Colorado, Maine, Minnesota, and Oregon.

https://tworzywa.online/

Omya finally completes acquisition of Distrupol

Omya, a global producer of minerals and distributor of specialty materials, has completed the acquisition of Distrupol – one of the leading suppliers of plastics in the United Kingdom, Ireland, and the Nordic countries. With this transaction, which also includes Distrupol's recently expanded operations in continental Europe, Omya strengthens its presence in European markets. The newly acquired company will become part of Omya Performance Polymer Distribution – a division based in Switzerland, aimed at developing a global polymer distribution platform. This strategic merger will allow the company to better respond to dynamic market changes and the growing demand for plastics. Carsten Harms, CEO of Omya Performance Polymer Distribution, emphasized the importance of integration saying, that Omya's priority is to maintain a high level of service for customers and business partners and ensure a seamless integration of both companies. Richard Orme, Managing Director of Distrupol, noted that this is an excellent opportunity for Distrupol and Omya, because it opens new opportunities for the company. Collaborating with Omya will enable us to grow and create a global polymer distribution platform. Omya's acquisition of Distrupol is another step in the consolidation of the European plastics distribution market. The combination of expertise from both companies is expected to benefit both customers and suppliers, enabling more efficient delivery of materials in key industrial sectors.

https://tworzywa.online/

Bausano launches extruder exchange program

The Italian extruder manufacturer Bausano has launched a program for exchanging older twin-screw extruders (MD models) for new ones. As part of the Formula Reward initiative, customers can receive up to 30% above market value for their used machines, making it easier to upgrade and improve the energy efficiency of manufacturing plants. The valuation of exchanged machines is based on several factors. The company analyzes the resale value of similar Bausano models in the used machinery market and then conducts a detailed technical inspection. The assessment includes the overall condition of the machine, the number of hours worked, and the wear and tear of key components such as the barrel and screws. This allows Bausano to determine the exact value of used extruders, taking into account both their performance and the market situation. Once the machine is accepted, Bausano carries out a renovation. Each extruder is equipped with the modern Digital Extruder Control 4.0 system, which optimizes production processes and improves the ability to monitor the machine's performance. Additionally, energy-efficient drives are installed, and mechanical upgrades are carried out, including the replacement or renovation of screws, barrels, and wear parts. The electrical system is also modernized, with new control panels, wiring, and safety systems. As a result, the refurbished extruders are an attractive solution for companies seeking reliable, upgraded machines at a competitive price. As Giorgio Critelli, Regional Manager at Bausano, emphasizes, the initiative aligns with the Transition 5.0 concept, which focuses not only on

technological advancement but also on a change in approach to industrial production. The company aims to support businesses in adapting to current market demands by combining innovation with an environmentally conscious approach to manufacturing.

https://tworzywa.online/

RecyClass updates recycling procedures

RecyClass is a European certification system that evaluates the recyclability of packaging materials and their participation in recycling. RecyClass has updated its recycling suitability assessment procedures and packaging design guidelines for recyclability. These changes are based on the results of 18 research activities conducted in 2024, which analyzed the impact of various packaging features on recycling streams. One of the key areas of research was sorting processes, which are fundamental for identifying issues related to the behavior of packaging during recycling. Attention was drawn, among other things, to the sorting of small packages, the behavior of rigid packaging during sorting, and the impact of decorations on recycling efficiency. Research on polystyrene (PS) packaging focused, among other things, on the impact of container wall thickness on the recycling process. For flexible packaging, the section on lamination adhesives was revised, and polyvinyl alcohol (PVOH) was classified as a material having limited compatibility with the recycling of colored polyethylene (PE). In the case of rigid packaging, it was found that ethylene-vinyl acetate (EVA) is fully compatible with high-density polyethylene (HDPE) recycling, and recommendations for the use of foamed polyolefin (PO) materials have been extended to polypropylene (PP) streams. All tests were conducted in independent laboratories in accordance with standardized methods defined in RecyClass's recyclability assessment protocols. The organization also collaborated with other entities, such as SPICE, to gather additional information on specific packaging properties. For example, thermoplastic elastomers based on styrene (TPS) were classified as compatible with both HDPE and PP streams, which is particularly important for cosmetic packaging.

https://tworzywa.online/

Azek expands recycling capacity with acquisition of northwest polymers

The Azek Company Inc. has announced the acquisition of Northwest Polymers, an industry leader in post-industrial and post-commercial plastic recycling, based in Molalla and Aurora, Oregon. Azek, a manufacturer of high-quality, low-maintenance, and environmentally sustainable outdoor living products, views the acquisition as a significant step in its long-term growth strategy. According to the company, it will enhance its ability to source and process recycled materials, supporting its continued expansion and margin growth objectives. said Jesse Singh, CEO of The Azek Company Inc. said, that Northwest Polymers has built a strong reputation for sourcing, processing, and supplying high-quality recycled plastic materials to various industries, and he is excited to welcome Northwest Polymers into the Azek family. The company is located in close proximity to our Boise manufacturing facility, this acquisition will strengthen Azek material supply chain in the western United States, improve cost efficiencies, and enhance its ability to meet the growing demand for beautiful, low-maintenance, and sustainable outdoor living solutions. According to the company, the acquisition also supports the expansion of Azek's Full Circle PVC Recycling program across the western United States. This initiative, which focuses on collecting and recycling post-construction PVC scrap, ensures that the material is repurposed into high-performance, sustainable building products across the Azek portfolio, further reducing landfill waste. Azek's Full Circle PVC Recycling program makes it easier for contractors and OEMs to position themselves as environmentally conscious builders and fabricators. As the largest vertically integrated recycler of PVC in the United States, Azek remains committed to accelerating the use of recycled waste and scrap materials in the production of its premium outdoor living products. Bill Waltz, president and CEO of Atkore, owner of Northwest Polymers, highlighted that his company continuously reviews the strategic direction of all aspects of its business, including potential acquisitions and divestitures. In 2022, Atkore acquired two related Oregon-based companies, Northwest Polymers and Cascade Poly Pipe & Conduit, a manufacturer specializing in smooth-wall HDPE conduit. Atkore has confirmed that the sale of Northwest Polymers will not impact its ongoing operations for the HDPE product, which primarily serves the telecommunications, utility, and datacom markets. Azek's business units include TimberTech, Azek Exteriors, Ultralox, Versatex, Scranton Products, StruXure, and Intex Millwork Solutions. The company operates manufacturing and recycling facilities in Ohio, Pennsylvania, Idaho, Georgia, Nevada, New Jersey, Michigan, Minnesota, and Texas.

https://www.plasticstoday.com/

AIMPLAS joins the REFEST project

The EU-funded project addresses the growing need to reduce fuel consumption and greenhouse gas emissions in traditional fishing vessels. It focuses on modernization requirements for fishing vessels, environmental and biodiversity impact assessments, battery design and sensor integration, and economic and social evaluations. Launched on May 1, 2024, and funded under the EU Mission "Restore our Ocean and Waters by 2030," the REFEST project seeks to develop scalable solutions capable of reducing emissions by up to 40%. The technologies developed will be practical, easily deployable and economically sustainable, making a significant impact on

small fishing fleets. The REFEST consortium comprises 14 experienced academic and industrial partners from 10 countries, including Italy, Spain, Turkey, Lithuania, Norway, Denmark, Sweden, France, Germany, and Poland. This group brings multidisciplinary expertise from the maritime, scientific, technological and industrial sectors to develop concrete and innovative solutions. AIMPLAS contributes its expertise in materials research and innovation, ensuring success in meeting European environmental standards. The company aims to improve fiber-reinforced composites currently used in the marine industry to produce hull appendages. A commercially available thermoplastic resin will be modified to reduce the effect of seawater ageing in composites and increase the compatibility of the manufactured composite with the selected paintings and coatings. Additionally, and in collaboration with the project's partners CALSENS and RISE, AIMPLAS will integrate optical and piezoelectric sensors in the proposed composites so that a range of predefined variables, such as the hydrodynamic pressure or the mechanical performance, can be measured in real-time. It will also develop novel thermoplastic composites, in UD-Tape format, specifically formulated to produce battery box components and comply with the standards governing the marine industry, particularly those regarding fire protection and electromagnetic interference. The REFEST project has initiated important networking activities and synergies with other EU-funded initiatives in the maritime and environmental sectors. These collaborations are expected to enhance the impact of the REFEST solutions and foster further innovation through exchanging knowledge, technologies, and best practices.

https://interplasinsights.com/

Industry giants launch automotive plastics recycling project

The Global Impact Coalition, a CEO-led initiative to help the chemical industry transition to net-zero, has launched a pilot project in Germany and the Netherlands to recycle plastics from end-of-life vehicles (ELVs). Industry giants BASF, Sabic, Covestro, Clariant, LyondellBasell, Mitsubishi Chemical Group and Solvay, founding members of the coalition, are joining forces with dismantlers, shredding companies and sorting facilities to create a circular network for plastics from ELVs. The pilot, taking place in the Netherlands and Germany, will dismantle, shred and sort plastic fractions, clustered into 10 types of polymers and automotive parts from 100 end-of-life vehicles. These sorted plastic fractions will then be recycled by the collaborating companies with each of their specific technologies. Focusing on bulk aggregation of ELV plastics, the pilot will serve to test and optimize a new approach to dismantling, sorting and recycling plastic fractions under real-world conditions. Charlie Tan, CEO of the Global Impact Coalition said, that this collaboration represented a turning point for the industry. Recycling ELV plastics has long been a challenge, with less than 20 percent of these materials recycled today. By uniting players from across the automotive value chain – from auto makers to dismantlers, sorters, recyclers and the chemical industry will close the loop on plastics. In 2020, the EU collected 1,009 metric tons of ELV plastics, but only 19 percent were recycled, with 41 percent being incinerated for energy recovery and 40 percent ending up in landfills. With over 6 million vehicles reaching the end of their life each year in Europe, millions of tonnes of valuable materials are lost to the economy annually. By pooling demand for a wide variety of ELV polymers, the initiative seeks to demonstrate the economic feasibility of large-scale closed-loop recycling systems. The pilot is expected to yield valuable data to guide broader industry adoption. Following its conclusion, the project will focus on scaling up efforts regionally in Europe and expanding to other key markets for ELV plastics recycling and production. Lars Kissau, president Net Zero Accelerator at BASF emphasized that the goal of this pilot is to move beyond theoretical discussions and test real-world solutions for ELV plastics recycling. The project announcement comes as the European Parliament is discussing amendments to the bloc's new directive for end-of-life vehicles. In early February, the Parliament voted for watered down quotas for recycled plastic in new vehicles at first-reading. The draft proposes amendments to the European Commission's proposed regulation, including reducing recycled plastic content target in new vehicles from 25% to 20%. It also proposes that 15 percent, rather than the previous 25 percent, of this recycled content is achieved from end-of-life vehicles in a closed-loop. Importantly, the changes say post-industrial plastic and bio-based plastic may count towards the targets. The rapporteurs also explicitly added chemical recycling as an option to consider when choosing between the 'best available recycling technologies' to calculate recycled plastic content.

https://www.plasticsnews.com/

mgr Mateusz Borkowski

TECHNICAL NEWS

Sabic introduces new material for automotive industry

SABIC introduces the NORYL GTX LMX310 material, designed for applications in the automotive industry, particularly in electric vehicles. This material is used in large body components, such as service covers, which require proper dimensional stability and resistance to deformation. NORYL GTX LMX310 is an unreinforced, electrically conductive PPE (polyphenylene ether) blend with very low moisture absorption. Compared to polyamides PA6 and PA6.6, which can absorb a significant amount of moisture, NORYL GTX LMX310 exhibits significantly lower absorption – up to 85% less in equilibrium conditions. This helps reduce the risk of part deformation by up to 90%, which is crucial for precision body components. Additionally, this material demonstrates high-temperature resistance, allowing it to be painted directly on the production line. This eliminates the need for separate painting processes, which can contribute to cost optimization in manufacturing. Currently, several automakers are testing this material for use in service covers and other body components, such as handles, which require durability and an aesthetically pleasing finish.

https://tworzywa.online/

Arburg to present its innovations at Chinaplas 2025

The German injection molding machine manufacturer Arburg has announced its exhibition program for Chinaplas 2025, which will take place in Shenzhen from April 15–18. The company will showcase solutions tailored to the needs of the Asian market, focusing on precision electric machines from the Allrounder E Golden Electric Evo series, component production systems for the e-mobility sector, as well as digitalization and automation of injection molding processes. Arburg will bring two machines from the Allrounder E Golden Electric Evo series to the trade fair, known for their high precision and energy efficiency. Compared to standard hydraulic injection molding machines, dry cycle times can be reduced by up to two seconds, while energy consumption can be lowered by 50%. The 470 E Golden Electric Evo model (with a clamping force of 1,000 kN) will be demonstrated in liquid silicone rubber (LSR) processing, using a 160-cavity cold-runner mold from Fangyi. The produced sealing elements, weighing just 0.06 g, will be used in automotive connectors to protect cables from fluid ingress. The second model, Allrounder 570 E Golden Electric Evo (with a clamping force of 2,000 kN), will be presented in the production of syringe cylinders made of cyclic olefin polymer (COP). This material, used as a glass replacement, offers high transparency, good barrier properties, increased mechanical resistance, and lower production costs. The injection molding machine will be equipped with an 8-cavity Unistar mold and a Flexlift 10 linear system, allowing gentle removal and further transport of the molded parts. In response to the growing importance of e-mobility and the automotive sector in China, Arburg will also showcase an advanced system for producing high-voltage connector components. A key element of this system will be the Allrounder 1600 T injection molding machine with a rotary table and a clamping force of 2,000 kN. The production process will involve sequential overmolding of metal inserts to create electrical modules. The system will integrate two six-axis robots: a smaller robot will transport the inserts to the machine and arrange the finished components, while a larger robot will precisely position metal components in the mold. After the first-stage overmolding with glass-fiber-reinforced PBT, the parts will be transferred to the second half of the mold, where the final injection process will take place.

https://tworzywa.online/

New Dylight S X-ray inspection system for vertical packaging

Quality requirements in the food and pharmaceutical industries are constantly evolving. Audits and regulations, such as packaging legislation, require from manufacturers to maintain comprehensive documentation. At the same time, the diversity of packaging materials makes the use of advanced X-ray technologies essential. Companies face the challenge of making significant investments in the latest technologies to keep up with these changes. However, consumers are not willing to pay higher prices for everyday products. This is where the latest Dylight S X-ray inspection system comes in – it enables manufacturers to ensure the highest product safety and quality at an attractive price. Dylight S is equipped with X-ray technology featuring a side-mounted tube, allowing precise detection of foreign objects in lightweight, vertical packaging. This detector reliably identifies both metallic and non-metallic contaminants – including glass, rubber, stones, and plastic fragments – in containers such as PET bottles, Tetra Pak packages, and plastic cans. Additionally, it offers completeness and fill level inspection. Minebea Intec introduces another innovative feature in the Dylight S X-ray system: automatic parameter adjustment. This function optimizes product setup

and inspection processes by automatically adjusting settings to minimize false rejects. As a result, the system enhances production efficiency and improves detection accuracy. Another standout feature is image acquisition. With advanced software, the system can generate a second X-ray image based on the previously captured scan. This function allows users to adjust brightness, contrast, and scaling later, enabling the detection of foreign objects that may have been overlooked in the original images. During software development, special attention was given to ensuring a user-friendly and intuitive interface. With Dylight S, Minebea Intec once again sets an example of innovation and high-quality X-ray inspection. The system offers a pioneering combination of compact design, state-of-the-art technology, and low total cost of ownership – an ideal solution for companies seeking to meet high inspection

https://www.plastech.pl/

Injection-molded polyphenylsulfone for production of surgical lighting

Syensqo, a leading global supplier of high-performance advanced materials and chemical solutions, has collaborated with MezLight LLC, a company specializing in medical devices, to introduce an innovative surgical lighting system. The key components of this system were injection-molded using Radel® PPSU (polyphenylsulfone). The result of this partnership is MezLight, the world's first sterile surgical task light, designed to deliver bright, high-resolution focused illumination in the operating room while reducing the physical strain on surgeons, who typically rely on heavy and uncomfortable headlamps for extended hours. Its adjustable arm allows for precise lighting of the surgical field, improving ergonomics by eliminating the weight of conventional headlamps while ensuring unobstructed visibility when wearing face shields. The primary engineering challenge in developing MezLight was designing a lighting system capable of repeated steam sterilization while maintaining the necessary mechanical durability for handling and positioning during use. A high-temperature-resistant material was essential to withstand the heat emission from LEDs and prevent deformation, thanks to the high glass transition temperature of the polymer. Radel® PPSU was chosen for the removable lamp cover, ensuring sterilizability and durability, the power and brightness control housing, which was sealed against moisture ingress and the system successfully passed laboratory tests, proving its ability to endure at least 100 autoclave cycles. The patented MezLight, featuring Radel® PPSU components from Syensqo, is designed for use in hospitals, ambulatory surgical centers, military medical units and/or veterinary facilities. This innovative solution enhances surgical precision, ergonomics, and sterility, setting a new standard for medical lighting technology.

https://www.plastech.pl/

New lightweight 100% rPET bottle base StarLite-R Still from Sidel

StarLite-R Still is a new bottle base that incorporates Sidel's patented technology to ensure 100% integration of recycled PET (rPET), lightweight design, and high production speeds for water, juices, milk, and edible oils in packaging ranging from 0.25 L to 2.5 L. The primary goal of leading food manufacturers is to reduce production costs by minimizing weight, lowering blowing pressure, and decreasing energy consumption, all while striving to minimize the carbon footprint in response to regulatory pressure and consumer demands. Balancing production speed, material type, and bottle weight presents a complex challenge for manufacturers in maintaining high efficiency. However, the StarLite-R Still base addresses this challenge with precise bottle base shaping and efficient material distribution. Its innovative design also allows for easy integration into existing production lines, offering versatility, while requiring low blowing pressure, further enhancing its sustainability credentials. The StarLite-R Still bottle base is based on Sidel's patented technology, which ensures smooth material stretching and precise distribution, optimized venting for easy forming, and efficient cooling of the base—ideal for rPET materials that can be processed at higher temperatures. This new solution prevents the base from deforming or cracking, which is crucial for maintaining bottle integrity during production, handling, storage, transportation, and use. The rounded edges of the base mold also facilitate its shaping during blow molding, increasing the base's resistance to defects such as cracking during the blowing process. This feature is especially important for lightweight bottles, which, due to the thinner material, are more susceptible to such issues. With the high clearance of the base design, it prevents deformation, ensuring functionality and stability even under high-temperature conditions. The base also performs reliably during high-speed production thanks to efficient cooling. The cooling process prevents deformation and defects, maintaining consistent quality during fast production rates. By transitioning to 100% rPET with the StarLite-R Still solution, manufacturers can benefit from a reduction in CO_2 equivalent emissions by 2,400 tons annually. The bottle base can also be blow-molded at a lower pressure, requiring only 16 bar, which is up to 20% less than standard air-blowing operations, resulting in additional savings of 51 tons of CO_2 equivalent and €205,000 annually. The bottle base is also compatible with a wide range of grammages, including very lightweight bottles as low as 7g for the 500ml format.

https://www.plastech.pl/

Higher efficiency in polymer cup production

Kiefel GmbH, a leader in the design and production of machines for polymer and natural fiber processing,

automation, and tooling, has introduced the new SpeedFormer KTR 6.2 Speed machine (featuring a tilting forming table movement and Trim-in-place cutting within the same mold) for the mass production of polymer cups and coffee capsules. This latest technology provides higher efficiency and versatility in production, offering a 10% energy savings thanks to an optimized heating process. The external insulation of the radiators further enhances the machine's performance, not only reducing costs but also improving its environmental footprint. The advanced SpeedFormer KTR 6.2 cup-forming machine sets new standards in efficiency, delivering up to 50% higher output of high-quality cups and coffee capsules compared to other machine manufacturers.

https://www.plastech.pl/

The economical hot runner system EcoONE-Series

In plastic processing, cost optimization and shortened project timelines are crucial. DME has developed the EcoONE-Series hot runner system, which, through the standardization of key components, offers low implementation costs, ease of operation, and wide availability of spare parts. The reduction in tool and maintenance costs makes it an ideal solution for simple, mass production applications. The EcoONE-Series is a configurable hot runner system available in versions with 1, 2, 4, 6, 8, 10, 12, or 16 injection points, covering different channel system geometries. Depending on the user's needs, hot runner nozzles with thermal regulation or needle valve options can be selected. This makes it particularly beneficial for manufacturers in sectors such as household appliances, consumer electronics, automotive, and other industries using mass injection molding technologies. The system's element standardization includes nozzles, channel systems, and various collector spacing options, making configuration and adaptation to specific applications easier. A key advantage of the EcoONE-Series is the quick replacement of components, such as nozzle heaters and collectors, which reduces downtime and minimizes operating costs. The manufacturer ensures fast delivery times – technical drawings are available within 48 hours, and the standard delivery time is 3–4 weeks. Additionally, global support and local spare parts warehouses enable efficient system servicing. The EcoONE-Series is designed for processing popular materials such as ABS, PS, PE, TPE, PP, and TPO. However, it is not suitable for processing materials with additives or fillers due to operational parameter requirements. To achieve maximum performance, DME recommends using Smart Series Me temperature controllers, which provide precise control over the injection process in EcoONE-Series systems. With its combination of low cost, availability, and ease of use, the EcoONE-Series is an attractive option for companies looking for a simple yet effective hot runner system for large-scale production. DME, headquartered in Madison Heights, Michigan (USA), is one of the leading global suppliers of hot runner systems, injection molding components, and plastic processing accessories, with its products also available in the Polish market through local representatives and distributors.

https://tworzywa.online/

TOURS les JOURS announces new plant-based plastic straws

The straws are made with PHACT PHA biopolymer, which is produced by CJ Biomaterials, Inc (CJ BMS). In addition to being made from a safe, biobased material, the new straws are durable, flexible and won't become soggy in a beverage. Regina Schneider, Chief Marketing Officer, TOUS les JOURS, said, that introducing straws made from safe, plant-based materials to our U.S. stores is a meaningful step in sustainability that complements company dedication to incorporating plant-based menu items our guests love. As TOUS les JOURS expand to over 200 locations this year, reducing environmental footprint is more important than ever to meet sustainability goals. CJ BMS began developing a new biobased PHA compound that could meet certifications for compostability and marine biodegradability. In 2024, CJ BMS successfully launched PHACT CB0400A, a PHA compound made from CJ BMS' unique grades of amorphous and semi-crystalline PHA biopolymers. These component grades are certified as OK biodegradable MARINE by TÜV Austria, commercially compostable by the Biodegradable Products Institute, and biobased by the USDA BioPreferred program. Using this new PHA solution, CJ BMS partnered with ANU Drinkware to produce the plant-based straws that met the size and performance requirements for straws used in TOUS les JOURS stores. Max Senechal, Chief Commercial Officer of CJ Biomaterials emphasize, that the success of PHACT PHA straws at TOUS les JOURS reflects the expectations of consumers looking to brands to adopt safe, compostable solutions for food serviceware, such as straws. This launch also highlights how the collaboration between brands, converters, and biopolymer manufacturers, can accelerate the commercialization of biobased products that are circular, sustainable, and functional. Producing PHACT PHA begins when plant feedstocks capture and sequester atmospheric carbon dioxide in sugars through photosynthesis. These sugars are fermented by bacteria to produce PHA biopolymer that has a low carbon footprint, is compostable and biodegradable in marine and soil environments. CJ Biomaterials' PHA technology can produce a broad range of PHA polymers from fully amorphous to semi-crystalline.

https://interplasinsights.com/

mgr Mateusz Borkowski

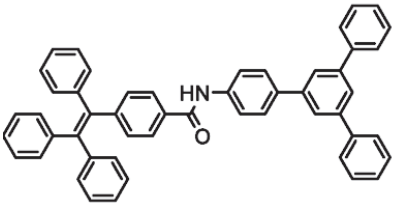
WYNALAZKI / INVENTIONS

Biodegradowalny materiał na bazie polisacharydu i sposób wytwarzania biodegradowalnego materiału na bazie polisacharydu – Magdalena Zdanowicz (Zgłoszenie Nr 445264, Zachodniopomorski Uniwersytet Technologiczny w Szczecinie)

Przedmiotem zgłoszenia jest biodegradowalny materiał na bazie polisacharydu, plastyfikowany mieszaniną na bazie mocznika charakteryzujący się tym, że plastyfikator stanowi mieszanina mocznika z guanidyną i/lub jej pochodną w stosunku molowym 1:1–1:6. Plastyfikator w mieszaninie stanowi 20–60 cz. mas. na 100 cz. mas. polisacharydu, a polisacharyd stanowi skrobia lub mąka skrobiowa. Mieszanina polisacharydu i plastyfikatora ma zdolność do termoprasowania lub wytłaczania i termoformowania. Zgłoszenie obejmuje także sposób wytwarzania biodegradowalnego materiału na bazie polisacharydu, plastyfikowanego mieszaniną na bazie mocznika charakteryzujący się tym, że jako plastyfikator stosuje się mieszaninę mocznika z guanidyną i/lub jej pochodną w stosunku molowym 1:1–1:6. Plastyfikator w mieszaninie stosuje się w ilości 20–60 cz. mas. na 100 cz. mas. polisacharydu, a jako polisacharyd stosuje się skrobię lub mąkę skrobiową. Mieszaninę polisacharydu i plastyfikatora termoprasuje się lub wytłacza i termoformuje (wg Biul. Urz. Pat. 2024, nr 52, 19).

***N*-(5′-fenylo-[1,1′:3′,1′′-terfenylo]-4-ylo)-4-(1,2,3-trifenylowinylo)benzamid i sposób jego otrzymywania – Artur Kasprzak, Jakub Cyniak** (Zgłoszenie Nr 445394, Politechnika Warszawska)

Przedmiotem zgłoszenia jest *N*-(5′-fenylo-[1,1′:3′,1′′-terfenylo]-4-ylo)-4-(1,2,3-trifenylowinylo)benzamid o wzorze (I) oraz sposób jego otrzymania z zastosowaniem reakcji sprzęgania, charakteryzujący się tym, że przygotowuje się mieszaninę kwasu 4-(1,2,2-trifenylowinylo) benzoesowego, 5′-fenylo-[1,1′:3′,1′′-terfenylo]-4-aminy i reagenta sprzęgającego w stosunku molowym 1:1:1, po czym do mieszaniny dodaje się roztwór kwasu solnego o stężeniu 1 mol/L. Uzyskany osad wydziela się z mieszaniny reakcyjnej na drodze ekstrakcji, zaś czysty produkt wyodrębnia się na drodze chromatografii kolumnowej (wg Biul. Urz. Pat. 2024, nr 53, 18).



(I)

Folia stretch i sposób wytwarzania folii stretch – Hubert Klamecki, Karolina Wiszumirska (Zgłoszenie Nr 445373, Folgos Sp. z o.o., Grabonog)

Wynalazek dotyczy wytwarzania folii stretch, w którym z regranulatu i dodatku modyfikującego przygotowuje się, poprzez mieszanie i wytłaczanie do postaci granulatu, przedmieszkę, po czym przedmieszkę miesza się z docelowym regranulatem, rozprowadzając równomiernie przedmieszkę w całej masie regranulatu. Następnie z tak przygotowanego surowca wytłacza się folię stretch metodą wylewania. Dodatkiem modyfikującym jest substancja CAS 119345-01-6 w formie proszku o gęstości nasypowej 260–320 g/L, a jako regranulat stosuje się regranulat polietylenu małej gęstości pochodzącego z recyklatu ze źródła pokonsumenckiego (PCR rLLDPE). Przedmieszkę sporządza się mieszając dodatek modyfikujący z regranulatem w proporcji 5:95 i prowadzi się wytłaczanie tej mieszaniny w temp. 190–205°C wytwarzając przedmieszkę w postaci granulatu o wielkości 2–3 mm. Następnie przedmieszkę miesza się z docelowym regranulatem PCR rLLDPE w proporcji masowej przedmieszka:regranulat 15:985 - 5:95. Przedmiotem zgłoszenia jest również folia stretch wytworzona metodą wylewania z regranulatu polietylenu małej gęstości pochodzącego z recyklatu ze źródła pokonsumenckiego (PCR rLLDPE) charakteryzująca się tym, że zawiera jako dodatek modyfikujący substancję CAS 119345-01-6 w formie proszku o gęstości nasypowej 260–320 g/L w ilości 0,075–0,25% mas. (wg Biul. Urz. Pat. 2024, nr 53, 20).

Kompozyt PLA /OSS z grupami metakrylowymi i sposób jego wytwarzania – Bogna Sztorch, Robert Przekop, Julia Głowacka, Daria Pakuła, Dariusz Brząkalski (Zgłoszenie Nr 445359, Uniwersytet im. Adama Mickiewicza w Poznaniu)

Przedmiotem zgłoszenia jest kompozyt na osnowie polilaktydu (PLA) z oktasferokrzemianami (OSS) posiadającymi jako grupy funkcyjne grupy metakrylowe i (trimetoksysililo)etylowe oraz sposób jego wytwarzania, mający zastosowanie do produkcji wyrobów z tworzyw polimerowych. Modyfikator stanowią oktasferokrzemiany z grupami matakrylowymi i (trimetoksysililo)etylowymi w zmiennej proporcji o podwyższonych parametrach mechanicznych i reologicznych Kompozyt PLA/OSS charakteryzuje się tym, że składa się z 95,0–99,9% polilaktydu (PLA) i 5,0–0,1% modyfikatora krzemoorganicznego (OSS) (korzystnie 99,0–99,1% PLA i 1,0–0,1% OSS). Modyfikatorem jest OSS-2MA-6TMOS albo OSS-4MA-TMOS, albo OSS-6MA-2TMOS. Sposób wytwarzania kompozytu w postaci koncentratu polega na tym, że PLA podgrzewa się powyżej temperatury mięknienia

do uzyskania polimeru w stanie uplastycznionym, dalej do 95,0% PLA dodaje się 5,0% modyfikatora OSS, otrzymanego w wyniku katalitycznej reakcji hydrosililowania oktasferokrzemianu (OSS) z olefinami: winylorimetoksysilan (VTMOS) oraz metakrylan allilu (MA) dodanych w odpowiednich stosunkach molowych, w obecności katalizatora, T=55°C oraz obecności toluenu, przy ciągłym mieszaniu w czasie 24–48 h. Następnie polimer wraz z modyfikatorem homogenizuje się do uzyskania jednorodnej masy, studzi się, granuluje i suszy w podwyższonej temperaturze albo do kompozytu w postaci koncentratu 5%, dodaje się na 500g kompozytu 250–490g PLA do uzyskania odpowiednio 2,5–0,1% modyfikatora OSS w kompozycie, gdzie pozostałą część stanowi koncentrat, po czym kompozyt wytłacza się do uzyskania kompozytu w postaci żyłki-filamentu do druku 3D (wg Biul. Urz. Pat. 2024, nr 53, 21).

Sposób recyklingu przedmiotów zawierających poli(tereftalan etylenu), zwłaszcza odpadów odzieży poliestrowej – Adam Hańderek, Anna Matuszewska, Robert Kukułowicz, Piotr Krupa, Beata Borowa, Tomasz Stachura (Zgłoszenie Nr 445353, Use Waste Prosta S.A., Warszawa; LPP S.A., Gdańsk)

Sposób recyklingu przedmiotów zawierających poli(tereftalan etylenu), zwłaszcza odzieży poliestrowej, prowadzi się tak, że na pierwszym etapie surowiec do recyklingu rozdrabnia się, a następnie oczyszcza się go. Na drugim etapie surowiec umieszcza się w reaktorze i dodaje się do niego mieszaninę estrów kwasów dwukarboksylowych w ilości co najmniej 100% m/m, po czym mieszaninę ogrzewa się do uzyskania temperatury 20–180°C przy ciśnieniu 0,5–1,5 bar i miesza się ją w czasie 5–30 minut z prędkością 3–8000 obrotów/minutę. na trzecim etapie prowadzi się odbarwianie surowca, przy czym zawartość reaktora ogrzewa się do temperatury 20–200°C i mieszaninę miesza się w czasie 5–30 minut z prędkością 3–8000 obrotów/minutę. Rozdrobniony i odbarwiony surowiec płucze się w acetonie do czasu usunięcia rozpuszczalnika odbarwiającego. Na czwartym etapie, prowadzi się glikolizę, przy czym do reaktora dodaje się nadmiar glikolu etylenowego, w ilości 20–500% wartości stechiometrycznej w stosunku do monomeru kwasu tereftalowego występującego w roztworze oraz dodaje się nadmiar katalizatora w ilości 5–20% wartości stechiometrycznej w stosunku do monomeru kwasu tereftalowego występującego w roztworze. Reakcję prowadzi się w czasie 5–60 minut w temperaturze co najwyżej 160°C przy ciśnieniu atmosferycznym. Na piątym etapie prowadzi się wytrącanie kwasu tereftalowego z glikolu etylenowego, przy czym prowadzi się reakcję, będącej w mieszaninie glikolem, soli sodowej kwasu tereftalowego albo soli potasowej kwasu tereftalowego z kwasem siarkowym (VI) o stężeniu 20–96%. Kwas siarkowy (VI) do mieszaniny dodaje się do uzyskania przez nią pH z zakresu 1–5. Następnie uzyskany roztwór filtruje się, przy czym na filtrze odbiera się kwas tereftalowy w postaci osadu. Na szóstym etapie przesączony roztwór krystalizuje się i uzyskuje się glikol etylenowy oraz wykrystalizowany siarczan (VI) sodu albo siarczan (VI) potasu (wg Biul. Urz. Pat. 2024, nr 53, 21).

Sposób otrzymywania paliwa z mieszaniny polietylenu i karbonizatu – Adam Gnatowski, Rafał Kobyłecki, Robert Zarzycki, Renata Gnatowska (Zgłoszenie Nr 448956, Politechnika Częstochowska)

Przedmiotem wynalazku jest sposób wytwarzania paliwa z karbonizatu i osnowy polimerowej, w procesie uplastycznienia i wytłaczania z napełniaczem sproszkowanego tworzywa o określonej frakcji, z materiałów polimerowych pochodzących z recyklingu i węgla z biomasy, przeznaczonego do spalania w paleniskach i kotłach energetycznych. Sposób otrzymywania paliwa z osnową polimerową charakteryzuje się tym, że obejmuje następujące etapy. Karbonizat korzystnie z biomasy pochodzenia rolnego o wartości opatowej nie mniejszej niż 18 MJ/kg z procesu termicznego przetwarzania rozdrabnia się i schładza do temperatury nie większej niż 95°C i przesiewa. Miesza się napełniacz w postaci karbonizatu w formie sypkiej oraz osnowę polimerową w mieszarce bębnowej, przy czym napełniacz ma frakcję do 0,5 mm (korzystnie 0,2–0,4 mm) w ilościach masowych 10–32% (korzystnie 15%), natomiast osnowa jest w postaci sproszkowanego tworzywa LDPE o frakcji 100–200 μm w ilościach odpowiednio do napełniacza 68–90%. Następnie wprowadza się mieszaninę do układu uplastyczniającego wytłaczarki dwuślimakowej (korzystnie współbieżnej) i prowadzi się homogenizację składników w układzie uplastyczniającym wytłaczarki posiadającym strefę zasilania o temp. 160–175°C (korzystnie 170°C), strefę sprężania o temp. 170–180°C (korzystnie 180°C) oraz strefę dozowania o temp. 180–190°C (korzystnie 190°C). Następnie wytłacza przy temperaturze głowicy wytłaczarskiej wynoszącej 180–185°C (korzystnie 185°C), a uzyskany kompozyt rozdrabnia po schłodzeniu do temperatury 30°C za pomocą granulatora do frakcji 1,5 mm (wg Biul. Urz. Pat. 2024, nr 53, 22).

Sposób wytwarzania siarczanu(VI) potasu i chlorku magnezu z wykorzystaniem procesu podwójnej wymiany jonowej – Józef Hoffmann, Krystyna Hoffmann, Dominik Nieweś, Mateusz Olczak, Marta Huculak-Mączka, Szymon Penkala, Jakub Zieliński, Ewelina Klem-Marciniak, Kinga Marecka, Marcin Biegun, Maciej Kaniewski, Andrzej Biskupski (Zgłoszenie Nr 445498, Politechnika Wrocławska)

Wynalazek dotyczy sposobu wytwarzania siarczanu(VI) potasu oraz chlorku magnezu charakteryzujący się tym, że na pierwszym etapie na kolumnę wypełnioną silnie kwasową żywicą jonowymienną podawane są równolegle roztwory siarczanu(VI) magnezu o stężeniu 8,9–20% mas. i temp. 20–40°C na pierwszą kolumnę z natężeniem objętościowym wynoszącym 20–30 cm^3/min oraz chlorku potasu o stężeniu 10,5–22,6% mas. na dru-

gą kolumnę, otrzymując kwas siarkowy(VI) jako odciek z pierwszej kolumny oraz kwas chlorowodorowy jako odciek z drugiej kolumny. Na drugim etapie uzyskane odcieki wprowadza się na kolumny krzyżowo, roztwór kwasu chlorowodorowego przepuszcza się przez kolumnę, przez którą wcześniej przepuszczono roztwór siarczanu(VI) magnezu, natomiast roztwór kwasu siarkowego(VI) kierowany jest na kolumnę, przez którą w pierwszym etapie przepuszczono chlorek potasu, przy czym utrzymuje się przepływ objętościowy na poziomie 10 cm^3/min, uzyskując w końcowym etapie roztwory chlorku magnezu i siarczanu(VI) potasu (wg Biul. Urz. Pat. 2025, nr 1, 16).

Sposób wytwarzania siarczanu(VI) magnezu – Józef Hoffmann, Krystyna Hoffmann, Dominik Nieweś, Mateusz Olczak, Marta Huculak-Mączka, Szymon Penkala, Jakub Zieliński, Ewelina Klem-Marciniak, Kinga Marecka, Marcin Biegun, Maciej Kaniewski (Zgłoszenie Nr 445264, Politechnika Wrocławska)

Zgłoszenie dotyczy sposobu wytwarzaniu siarczan(VI) magnezu polegającego na tym, że na pierwszym etapie wodny roztwór chlorku magnezu o stężeniu 9,7–25% mas. i temp. 25–40°C wprowadza się do kolumny wypełnionej żywicą jonowymienną z objętościowym natężeniem przepływu wynoszącym 10–30 cm^3/min otrzymując odciek, będący wodnym roztworem kwasu chlorowodorowego. Następnie do kolumny wypełnionej żywicą jonowymienną wprowadza się wodny roztwór kwasu siarkowego(VI) o stężeniu 10–20% mas. i temp. 20–30°C z objętościowym natężeniem przepływu wynoszącym 15–20 cm^3/min, otrzymując odciek, stanowiący wodny roztwór siarczanu(VI) magnezu o stężeniu 9–20% mas (wg Biul. Urz. Pat. 2025, nr 1, 17).

Fotoutwardzalny związek i samonaprawiająca się kompozycja polimerowa z fotoutwardzalnym związkiem – Paulina Bednarczyk (Zgłoszenie Nr 445503, Zachodniopomorski Uniwersytet Technologiczny w Szczecinie)

Przedmiotem zgłoszenia jest fotoutwardzalny składnik o właściwościach samonaprawczych charakteryzuje się tym, że stanowi difunkcyjny monomer akrylanowy z wbudowaną w cząsteczkę podwójną strukturą adduktu Dielsa-Aldera w postaci (1,3-fenylenobis(1,3-diokso-1,2,3,3a,7,7a-heksahydro-4H-4,7-epoksyizoindolo-2,4diylo))bis(metyleno)bis(2-metyloakrylanu), przy czym addukt Dielsa-Aldera otrzymywany jest w reakcji Dielsa-Aldera pomiędzy dienofilem w postaci *N*,*N*'-(1,3-fenyleno)dimaleimidu, a dienem w postaci metakrylanu furfurylu. Przedmiotem zgłoszenia jest też kompozycja polimerowa z fotoutwardzalnym składnikiem o właściwościach samonaprawczych zawierająca oligomery i monomery akrylanowe oraz fotoinicjator, charakteryzująca się tym, że składa się z 25–65% mas. oligomerów (met)akrylanowych, 10–50% mas. monomerów (met) akrylanowych, 10–50% mas. difunkcyjnego monomeru akrylanowego z wbudowaną w cząsteczkę podwójną strukturą adduktu Dielsa-Aldera (1,3-fenylenobis(1,3-diokso-1,2,3,3a,7,7a-heksahydro-4H-4,7-epoksyizoindolo-2,4-diylo))bis(metyleno)bis(2-metyloakrylanu), który stanowi fotoutwardzalny związek oraz 1–10% mas. fotoinicjatora rodnikowego. Udział wszystkich składników kompozycji polimerowej wynosi 100% (wg Biul. Urz. Pat. 2025, nr 1, 17).

Sposób otrzymywania włókniny filtracyjnej z octanu celulozy – Agnieszka Gadomska-Gajadhur, Paweł Ruśkowski, Mateusz Cegłowski, Mikołaj Nowicki (Zgłoszenie Nr 449259, Politechnika Warszawska)

Przedmiotem zgłoszenia jest sposób otrzymywania włókniny filtracyjnej z octanu celulozy, gdzie przygotowuje się układ rozpuszczalnika w postaci mleczanu etylu i acetonu w stosunku objętościowym 1:1–3:1, po czym dodaje się octan celulozy o stopniu podstawienia nie większym niż 1,5 i miesza się do momentu rozpuszczenia octanu celulozy. Następnie otrzymany roztwór octanu celulozy o lepkości w zakresie 0,5–10,0 Pa·s odgazowuje się i prowadzi się proces elektroprzędzenia z prędkością dozowania roztworu w zakresie 0,25–1,50 ml/h, przy liniowej prędkości obrotowej kolektora w zakresie 0,5–1,5 m/s, przy napięciu o wartości w zakresie 12–20 kV (wg Biul. Urz. Pat. 2025, nr 1, 18).

Kompozyt polipropylenowy o zmniejszonej palności i wysokich właściwościach wytrzymałościowych – Jacek Iwko, Roman Wróblewski (Zgłoszenie Nr 445533, Politechnika Wrocławska)

Przedmiotem zgłoszenia jest kompozyt polipropylenowy o zmniejszonej palności i wysokich właściwościach wytrzymałościowych, zawierający polipropylen oraz polifosforan amonu, charakteryzujący się tym, że w jego skład wchodzi: polipropylen PP ilości 73% mas., polifosforan amonowy APP w ilości 15% mas., dipentaerytryt DPER w ilości 10% mas. oraz tlenek antymonu Sb_2O_3 w ilości 2% mas (wg Biul. Urz. Pat. 2025, nr 2, 9).

Kompozyt polipropylenowy o zmniejszonej palności – Jacek Iwko, Roman Wróblewski (Zgłoszenie Nr 445534, Politechnika Wrocławska)

Zgłoszenia dotyczy kompozytu polipropylenowego o zmniejszonej palności zawierającego polipropylen oraz polifosforan amonu, charakteryzujący się tym, że w jego skład wchodzi: polipropylen PP w ilości 73% mas., polifosforan amonowy APP w ilości 15% mas., pentaerytryt PER w ilości 10% mas. oraz tlenek chromu Cr_2O_3 w ilości 2% mas. (wg Biul. Urz. Pat. 2025, nr 2, 9).

mgr inż. Małgorzata Choroś

NEW BOOKS

PHOTOFUNCTIONAL NANOMATERIALS FOR BIOMEDICAL APPLICATIONS
Editors: Chunxia Li, Jun Lin (Wiley)
1st edition, 2025, 592 pages, 169.00 EUR
ISBN: 9783527353330
ISBN: 9783527845347 (e-Book)

This publication presents the latest research and developments surrounding photofunctional nanomaterials, including rare earth luminescence nanomaterials and photothermal agents, for biomedical applications related to imaging, biosensing, controlled drug delivery and release, and tumor diagnosis and therapy, as well as other applications such as bacteria engineering, optical information storage, acoustic sensing, and temperature detection. The book elucidates the underlying functioning mechanisms of these nanomaterials in depth and extensively discusses their current challenges and future development prospects. Written by two highly qualified professors with significant research experience in the field, the book discusses sample topics including the fabrication of composites based on lanthanide-doped up conversion nanomaterials and metal-organic frameworks, photosensitizers for photodynamic therapy (PDT), covering basic principles of PDT, classifications of various photosensitizers, mechanisms during treatment, and x-ray-activated PDT. It also covers nanomaterials-induced pyroptosis and immunotherapy including pyroptosis pathways and their potential in immunotherapy, especially in activating effector T cells and promoting dendritic cell maturation. Readers can find here information's about the design of ternary quantum dots, antibacterial mechanisms in photofunctional antibacterial nanomaterials, and inorganic nanomaterials in photothermal therapy, which allows to establishing a robust groundwork for the future clinical translation. This book is an essential up-to-date reference on the subject for materials scientists, photochemists, biochemists, and electronic engineers.

NATURAL FIBER-REINFORCED PLA COMPOSITES
Processing, Characterization and Applications
Editors: Chandrasekar Muthukumar, Senthilkumar Krishnasamy, Senthil Muthu Kumar Thiagamani, Mohamad Ridzwan Bin Ishak (Elsevier)
1st edition, 2024, 550 pages, 195.50 EUR
ISBN: 9780323952477
ISBN: 9780323952484 (eBook)

Amongst thermoplastic biodegradable polymers, polylactic acid (PLA) has been widely used in many different applications but it still has limited use in various industrial sectors such as medical, packaging, textile, water, and wastewater treatment. To increase the use of these materials more information is needed on their properties, characterization, processing, safety, and sustainability. This book reviews the thermal, physico-chemical, fire retardant, mechanical, tribological, biodegradable and anti-microbial properties of these materials. Fabrication of PLA biocomposites using advanced fabrication techniques like additive manufacturing and electrospinning are also discussed in detail.

The book will be a valuable reference for academic and industrial researchers, materials scientists and engineers working in the development on polymers, bioplastics, polymer composites and biocomposites as well as industrial manufacturers.

GOLD NANOPARTICLES, NANOMATERIALS AND NANOCOMPOSITES
Science, Technology and Applications
1st edition, 2024, 750 pages, 289.84 EUR
ISBN: 9780443158971
ISBN: 9780443132704 (eBook)

This book provides a comprehensive review of recent research developments in the synthesis, processing, functionalization, characterization, and properties of gold nanoparticles (Au NPs) for a broad range of different applications. Emphasis is placed on the fundamental chemistry, different synthesis approaches, strategies for stabilization and control of shape size and morphology, surface chemistry and physicochemical characteristics, as well as surface functionalization and applications of Au NPs. The book also covers important topics such as biocompatibility, biodegradability, cytotoxicity and the health and environmental impact of Au NPs. It will be a valuable reference resource for academic and industrial researchers working in the fields of materials science and engineering, nanomaterials, polymer composites, and biomedical engineering.

PVC DEGRADATION AND STABILIZATION
George Wypych (Elsevier)
5th edition, 2025, 530 pages, 177.09 EUR
ISBN: 9781774670606
ISBN: 9781774670613 (eBook)

Fifth Edition of this book contains all the information necessary for the successful design of stabilization formulas in any PVC-based product. Other topics covered include degradation by thermal energy, UV, gamma, and other forms of radiation, chemical degradation, and more. Many new topics are of particular interest today, including new stabilization methods and mechanisms (e.g., synergistic mixtures containing hydrotalcites and

their synthetic equivalents, beta-diketones, functionalized fillers, Shiff bases), new approaches to plasticization, methods of waste reprocessing (life cycle assessment, reformulation, biodegradable materials, and energy recovery), accelerated degradation due to electric breakdown, and many more. Analytical methods for studying degradative and stabilization processes aids readers in establishing a system for verifying results of stabilization with different stabilizing systems. This publication is a valuable source of information for researchers in materials/polymer science, practicing materials scientists, and professional engineers.

ENGINEERED BIOCOMPOSITES FOR DYE ADSORPTION

Editors: Ahmad Hussaini Jagaba, Shamsul Rahman Mohamed Kutty, Mohamed Hasnain Isa, Abdullahi Haruna Birniwa (Elsevier)

1st edition, 2025, 472 pages, 182.74 EUR

ISBN: 9780443298776

ISBN: 9780443298776 (eBook)

The publication compiles and discusses applications, mechanisms, and performance evaluation of various biocomposites during dye adsorption. The book analyzes the techno-economic and life-cycle assessment of biocomposites for dye adsorption. It highlights different adsorbent materials for dye degradation and resource recovery ranging from but not limited to activated carbon, biochar, hydrochar, pyrochar, waste fruits, waste industrial sludge, geological materials, graphene, carbon nanotubes, MXene, polymers, metals, nanomaterials, and metal–organic frameworks. The book shows how combining materials such as biocomposites significantly gives better dye adsorption than a single material and addresses conventional issues with adsorption such as adsorbent cost, effectiveness, regeneration, and sustainability and provides insights into the preparation and use of new adsorbent materials for dye removal from aqueous solutions. The information contained in this book will increase readers' fundamental knowledge, guide future researchers, and can be incorporated into future works on experimental studies on dye adsorption. As such it serves as an indispensable resource and reference work for engineers, wastewater specialists, biotechnologists, chemists, microbiologists, researchers, and students studying industrial effluents, biomass, bioproducts, and adsorption processes.

ENCYCLOPEDIA OF POLYMER DEGRADATION

George Wypych (Elsevier)

1st edition, 2025, 350 pages, 277.09 EUR

ISBN: 9781774670484

ISBN: 9781774670491 (eBook)

This encyclopedia 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. The encyclopedia will be in interest of researchers in materials and polymer science, or other professional engineers.

CELLULOSE BASED HYDROGELS
Production, Properties, and Applications

Editors: Kalim Deshmukh, Shaswat Barua, Swagata Baruah, Chaudhery Mustansar Hussain (Elsevier)

1st edition, 2025, 504 pages, 170.00 EUR

ISBN: 9780443220494

ISBN: 9780443220500 (eBook)

This publication provides detailed information on the properties, characterization techniques, preparation methodologies, applications, and commercial viability of cellulose based hydrogels. The book starts with an in-depth overview of the structure of cellulosic materials and their chemical modification approaches, covering various forms of cellulose, such as nanocrystalline and nanofibrillar cellulose. The following chapters focus on characterization methods of such materials, including advanced techniques, followed by a through discussion of the strategies for preparation of cellulose based hydrogels. Finally, applications of cellulosic structures in different fields such as biomedicine, environmental science, and energy are presented. This is a valuable resource for researchers and advanced students across polymer science, nanomaterials, and materials science, as well as scientists, engineers, and R&D professionals with an interest in sustainable materials and their composites/nanocomposites for advanced applications.

THE DESIGN OF CHIRAL METAMATERIALS AND METASURFACES

Authors: Yaoliang Song, Igor Semchenko, Sergei Khakhomov, Lei Wang (Elsevier)

1st edition, 2025, 300 pages, 158.94 EUR

ISBN: 9780443335631

ISBN: 9780443335648 (eBook)

This book covers the theoretical and experimental study of the properties of chiral metamaterials (composite media that can be engineered to exhibit unique electromagnetic properties), metasurfaces, and helix-structured systems. This book also focuses on the practical applications of the physical properties and the phenomena that are characteristic of chiral metamaterials, including electromagnetic signal polarization conversion, selection, and electromagnetic wave absorption. Given

that chiral materials and metasurfaces offer solutions for manipulating electromagnetic waves by incorporating an additional degree of freedom, namely the ability to control the polarization of the wave, this book provides a welcome update for researchers and engineers working in the fields of optics, radio physics, biophysics, and condensed-matter physics.

CARBON-BASED NANOMATERIALS FOR GREEN APPLICATIONS

Editors: Upendra Kumar, Piyush Kumar Sonkar, Suman Lata Tripathi

1st edition, 2025, 640 pages, 149.60 EUR

ISBN: 9781394243396

ISBN: 9781394243402 (eBook)

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. This 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 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 includes separate chapters describing aspects of supercapacitors, solar cells, and fuel cells. This publication is ideal for scientists and researchers working in nanotechnology, life sciences, biomedical research, bioengineering, and a range of related fields.

PHYSICAL DEPOSITION METHODS FOR FILMS AND COATINGS

Lech Pawlowski (Wiley)

1st edition, 2025, 432 pages, 177.10 EUR

ISBN: 9781119713067

ISBN: 9781119713135 (eBook)

This book 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, the publication covers topics including the process of making a deposit that appears on the surface, growth of deposits, their post treatments, and characterization methods. It also discussed different physical and chemical deposition techniques including atomistic, chemical vapor, and various thermal spraying methods. Also, properties of deposits depending on the material and deposition technique are debated. Substrate preparation, coating microstructure, and morphology and stability of thin films is presented with examples of applications of thin films in optical devices, environmental applications, telecommunications devices, and energy storage devices. This publication is an essential reference on the subject for professionals and researchers in surface treatment and graduate students in related programs of study.

POLYMER CONCRETES
Advanced Construction Materials

Mostafa Hassani Niaki, Morteza Ghorbanzadeh Ahangari (RCR Press)

1st edition, 2025, 166 pages, 45.99 GBP

ISBN: 9781032353104

ISBN: 9781003326311 (eBook)

The book provides a comprehensive study on polymer concrete (PC), discussing historical perspectives of its use, the classification and applications of PC, and the advantages and disadvantages of its use. Materials such as resin, aggregates, micro fillers, fibers, and nanofillers are systematically summarized, as well as their effects on PC. Also examined are the properties, fabrication methods, and the standards for testing the material properties, as well as the future outlook for PC applications. This publication investigates the various properties of PC, covers the physical, mechanical, thermal, chemical, electrical, and environmental properties of PC. It also examines fabrication methods, standards for testing, and the future outlook for various applications. The book is ideal for students taking related courses in Civil, Mechanical, Chemical, and Material Engineering. It also serves as a useful guide for researchers in the areas of concrete and construction materials, composites and nanocomposites, and advanced materials, as well as professionals working in fields such as construction, precast concrete products manufacture, transportation and road construction, architecture, and more.

mgr Mateusz Borkowski

Guide for Authors

The „Polimery" journal publishes original research, scientific and technical papers, reviews and messages in the field of chemistry, technology and processing of polymer materials, caoutchouc, rubber, chemical fibers, paints and lacquers, environmental protection and computer modeling of chemical processes. **Each paper is subject to a review** by at least two reviewers (the review procedure is described in the web site *www.polimery.ichp.vot.pl*). By submitting a paper to the Editorial Office, Authors agree to the review process.

GENERAL REMARKS

Authors are asked to enclose with the submitted paper a statement that it has been neither published nor submitted for publication in any other domestic and abroad magazine.

At the moment of sending of a paper to the Editorial Office the copyrights are transferred to the Publisher, which has exclusive right to make use of the work, multiply it with any technique and publish in such a way that everybody could access it in a place and time at their convenience. Without prior consent of the Publisher the paper may be neither reproduced in any form nor translated.

Publishing of a paper describing experimental works requires sending to the Editorial Office the consent for publication by the manager of the institution employing the Author.

In order to prevent cases of ghostwriting and guest authorship it is required to send to the Editorial Office a statement concerning participation of individual authors in preparation of the paper and declaring its financing source.

If the submitted paper contains illustrations or other copyright protected materials, Authors are obliged to obtain prior consent in writing by the first publisher to use it, to cover related costs and to make reference to the original source of the materials included in the paper.

After a preliminary assessment by the Editorial Office and acceptance of the subject of the paper as compliant with the profile of the magazine, the paper is forwarded to further publishing stages.

The Authors are responsible for the substantive contents of the paper. The Editorial Office reserves them the right to make abridging, editorial modifications and to introduce necessary changes in terminology.

The Authors are obliged to proofread the submitted paper and return it within 48 hours from the moment they received the text.

PREPARATION OF THE TEXT

The Editorial Office kindly asks to get thoroughly acquainted with the information contained in this point, as in the case of gross disagreement with the herein included guidelines the paper shall not be accepted for further stages of the editorial process and shall be returned to the Authors.

General requirements

Papers in English (title, abstract and keywords in both languages) shall be submitted as MS Word files. Text figures and reaction schemes shall be contained in separate files. The text shall be written with Times New Roman font, 12 points, double line spacing and margins (left 4 cm and right 1.5 cm). Longer texts should be divided by the Authors into logically separate pieces, to be printed in subsequent issues of the journal.

The manuscriptmust contain first name and family name of the Author (Authors) along with exact business address and e-mail address (in case of collective works please select one Author for correspondence). Please provide the ORCID numbers (https://orcid.org/) of the Authors of the article (if they have).

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.

In the case of papers concerning experimental studies the following order should be kept: the aim of the work, experimental part (description of materials: trade name, manufacturer, country; processes; testing methods and equipment used: type, manufacturer, country), results and their discussion, conclusions, and reference index.

Abstract

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

Units and symbols

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

Tables

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

Mathematical equations

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.

Chemical equations shall be marked with consecutive Roman numerals.

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.

To prepare graphs please use *Excel* application. The graphs area shall be framed and may contain uncondensed auxiliary grid. Frame and grid lines shall be 0.5 pt thick and data plots 1 pt thick. Axes description shall include the name of the presented variable (starting with upper case letter) and unit of measure, separated with comma.

Descriptions contained in schemes, photographs and graphs shall have font Palatino Linotype 9 pt.

REFERENCES

References shall be numbered in the order of the first reference in the paper. Each item shall be composed according to the following examples.

A paper in a magazine

[Item No] Family name of the 1st author, given name initials with dots, family name of the 2nd author, given name initials with dots etc.: *abbreviated magazine name according to CAS Source Index* **year of issue**, *volume No*, page No (optionally, comma separated, DOI No, if it was assigned). *Example*:

[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

A book

[Item No] Family name of the 1st author, given name initials with dots, Family name of the 2nd author, given name initials with dots etc.: "Full title of the book in the original language" (1st editor family name, given name initials, 2nd editor family name, given name initials etc.) publisher, place and year of issue, page number. *Example*:

[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

[Item No] *Pat. Abbreviated country name* Number (year). *Example*:

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

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

Conference materials

[Item No] Family name of the 1st author, given name initials with dots, Family name of the 2nd author, given name initials with dots etc.: "Full title of the paper in the original language" Materials from Conference name, place, date, page No. *Example*:

[1] Kapelski D., Slusarek B., Jankowski B. *et al.*: "Powder magnetic circuits in electric machines", Materials from 14th International Conference on Advances in Materials and Processing Technologies, Istanbul, Turkey, June 13—16, 2011, p. 43.

Web sites

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

Example:

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

RAPID COMMUNICATION

The Original papers, in English only (about 4 typewritten pages as described above and containing possibly 2–3 figures or 1–2 tables). A fast path of printing (about month since the date of receipt by the Editorial Office).