



**Institute of Biopolymers and Chemical Fibres**

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# **CIRCULAR ECONOMY – TRENDS in the DEVELOPMENT of BIOPOLYMERS MARKET**

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**Idea of the **Circular Economy** called a „closed-loop economy”= production of minimum waste, and it which, if they are generated become raw materials**

**Wastes on our planet can be minimized by the implementation of responsible research to further the innovation principle, i.e.,**

**“reduce, reuse, and recycle”.**

**This means that each individual must reduce waste and, if he or she has have generated any, reuse it or recycle it.**

**The circular economy is thus an economy in which production and consumption are organized in such a way that the value of products, components, materials, and resources is maintained within the value chain and products' life-cycles.**

**Resource efficiency is maximized, while the extraction of raw materials and production of wastes are minimized.**



**Idea of the **Circular Economy** called a „closed-loop economy”= production of minimum waste, and it which, if they are generated become raw materials**

**The primary issue is, that if we do indeed want to rise to the challenge of an enormous growth of scientific research and innovation, than the relationship between science and society has to be interactive.**

**This will not be possible if the public sector – local, regional and national authorities won't be able to give a concrete support – to develop policies or to establish a friendly ecosystem to support this challenge driven concept**

**Simultaneously **Responsible Research for Innovation RRI-relates to and has an impact on business.****

**The crucial question is IF and HOW governance should respond to the RRI challenges to impose its implementation and to build trust between in Quarter Helix Actors:**

**Stakeholders- Reasearch Institutes-Industry -Business-Policy Makers** at different levels (national, regional and local).



# IBWCh GENERAL INFORMATION

**DIRECTOR:** Radosław Dziuba, Ph. D.

**FOUNDED** 1952

**STATUS** public Research & Development unit reporting to  
Ministry of Development

**STAFF** 106 persons in total  
specialized in: materials engineering, biopolymers, chemical fibres,  
textiles, chemistry, biochemistry, microbiology, pulp and paper  
technology.





# IBWCh STRATEGY of SCIENTIFIC POLICY

- **conducting extensive research, development and implementation activities based on the latest research direction in the bio-chem-tech areas**
- **development of modern R & D infrastructure**
- **strengthening of science-industry cooperation**
- **realization of important economic and social objectives and tasks for the needs of the national economy**
- **strengthening of the position on international market**
- **marketing activities aimed commercialization of research results**
- **educational, training and standardization activities**

# DIRECTIONS OF ACTIVITY





# DIRECTIONS OF ACTIVITY OF IBWCh in the FIELD of BIOPOLYMERS

## **MATERIALS:**

- natural polymers: cellulose, chitosan, alginate, keratin;
- biodegradable thermoplastic polymers: aliphatic-aromatic co-polyesters, polylactide (PLA)

## **Modifications:**

- biochemical,
- physicochemical

## **Processing:**

- fibres, nonwovens,
- films, 3D forms, micro-
- and nano-structures

# **BIOPOLYMERS**

**APPLICATIONS:** medicine, agriculture, electronics,  
producers of papers, textiles, plastics , filters, packages



## Results of the European Market Analysis

According to the results of the market analysis of selected polysaccharide markets, with special reference to starch, hemicellulose, cellulose and natural polymers, including the chitin and chitosan- it has been noticed that in recent years **it was the market of the greatest development potential.**

The dominant position in all of the analyzed markets in Europe was occupied by producers from the countries of the “15 EU”.

From among the new member states, **the market position of Poland was, in most cases, among the most notable from amongst the countries of Central and Eastern Europe, where it was the highest on the European cellulose market, followed by hemicellulose, starch and polymers, including chitin and chitosan.**

Research was conducted on the basis of *Eurostat and Comtrade-UN* statistical data for production, import, export, and market volumes of the countries of the “15” (the “old” member states of the European Union) as well as of the “12” new European Union member states of CEE countries. – *comp. Wysokinska Z., Market for Starch, Hemicellulose, Cellulose, Alginate, its Salts and Esters, and Natural Polymers, Including Chitin and Chitosan: Analysis Results, Fibres& Textiles in Eastern Europe, Issue 6 (83) / pages 7–13.*





**Motto**  
**Let us try**  
**to take advantage**  
**of everything the**  
**Nature holds**  
**in order**  
**to create things**  
**healthy for**  
**humans,**  
**safe for the**  
**environment**  
**useful for**  
**technology**

# Conversion of industrial by-products, biomass and wood based raw materials into



## value-added products

„Wood based materials and fuels”

„Utilization of Biomass for Preparation of Environment-friendly Materials”

## Utilization of animal-derived wastes for the manufacture of new bio-products

### and composite materials

„Industrial feather waste for high added value keratin-based products”

### Biopolymers in medical and agricultural applications- 2017-2020

**TROMBOGUARD®** - first aid dressing developed at the IBWCh - Haemostatic wound dressing, active layer is a unique combination of active ingredients – chitosan, alginate and silver which are responsible for stop bleeding

**Dressing kit for injuries sustained by the uniformed services during official duties”** (Defence and security program of the state) *Zestaw opatrunkowy zabezpieczający urazy powstałe w trakcie pełnienia obowiązków służbowych przez służby mundurowe”*

„**Innovative urine draining prosthesis for patients with urinary bladder cancer treated with minimum invasive urinary bladder oncological surgeries”** ( Project implemented under the program "Prevention and treatment of civilization diseases" STRATEGMED / I) **2014 - 2017.** *„Nowoczesne protezy odprowadzające mocz dla pacjentów z rakiem pęcherza moczowego poddanych bezkontaktowym minimalnie inwazyjnym operacjom onkologicznym wycięcia pęcherza moczowego”*

„**Development of innovative biodegradable soybean seed coating based on biopolymers from renewable raw materials for better tolerance of plants to adverse environmental conditions”** (Program Biostrateg III), **2017-2020.** *„Opracowanie innowacyjnej biodegradowalnej otoczki dla nasion soi opartej na biopolimerach z surowców odnawialnych dla zwiększonej tolerancji roślin na niekorzystne warunki środowiskowe”*



# Conclusions

**Institute of Biopolymers and Chemical Fibres is advanced in:**

**conducting research related to use waste to produce innovative products or components for further production**

**The organization of this research is involved into the process of the implementation of the Circular Economy rules and principles**

**It means that it supports the process in which production and consumption are organized in such a way that the value of products, components, materials, and resources is maintained within the value chain and products' life-cycles between the Institute-Businesses-Different Branches of Industry (Electronics, Producers of Papers, Textiles, Plastics, Filters, Packages) Medicine, and Agriculture Sector and Policy Makers**

**THANK YOU FOR YOUR  
ATTENTION**