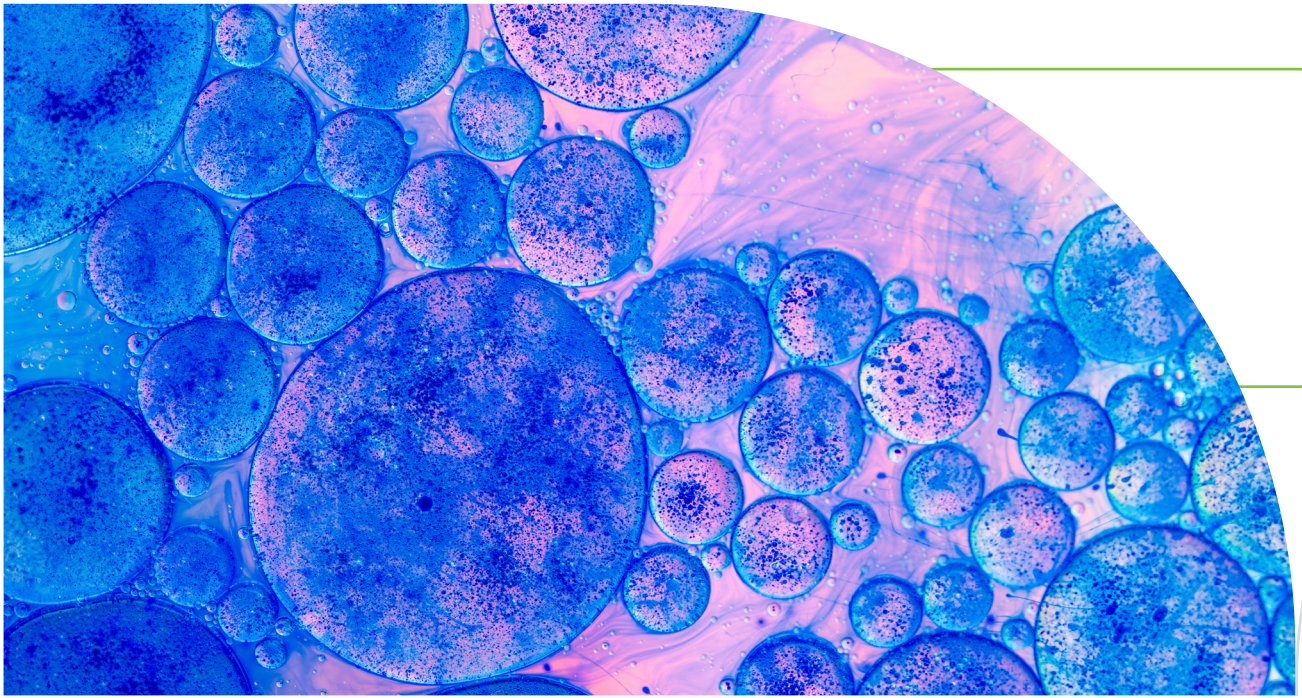
SUSTAINABLE FUTURE STARTS WITH CHEMISTRY

BIOTECHNOLOGY

Łukasiewicz
Industrial
Chemistry
Institute



RESEARCH OFFER

Screening of microorganisms – search for bioactive compounds

Optimisation and scale-up of biotechnological processes (up to 150 l scale)

Preparation of biological material for long-term storage (cell banks, lyophilisation)

Genetic engineering of microorganisms – design of chemical synthesis pathways, genome analysis based on sequencing, obtaining production strains

***In vitro* biological testing of substances** (e.g. cytotoxicity, anti-inflammatory properties)

SCREENING OF MICROORGANISMS: SEARCH FOR BIOACTIVE COMPOUNDS

in silico analysis: genome analysis, metabolic pathway engineering, plasmid design, knock-in/knock-out mutation design

next generation sequencing (NGS)

identification of microorganisms based on protein profile

gene expression level analysis (RT-qPCR, ddPCR)

determination of the microorganisms susceptibility to active substances – MIC, MBC, MFC tests

GENETIC ENGINEERING OF MICROORGANISMS

***E. coli's* own bacterial expression system**

construction of new expression vectors

obtaining genetically modified *E. coli* production strains – production of therapeutic proteins (e.g. monoclonal antibodies, growth factors, substitution enzymes), biopolymers, intermediates and chemical compounds

OPTIMISATION AND *SCALE-UP* OF BIOTECHNOLOGY PROCESSES

analysis, development and optimisation of biotechnology processes

execution of balances and development of kinetics of biotechnological processes

guidance and optimisation of microorganism culture conditions for different process modes: batch process, fed-batch process, continuous process

conducting and optimising processes based on the culture of microorganisms under aerobic or anaerobic conditions at laboratory scale in flasks and in bioreactors for maximum working volumes of 5 dm^3, 10 dm^3, 30 dm^3, 150 dm^3

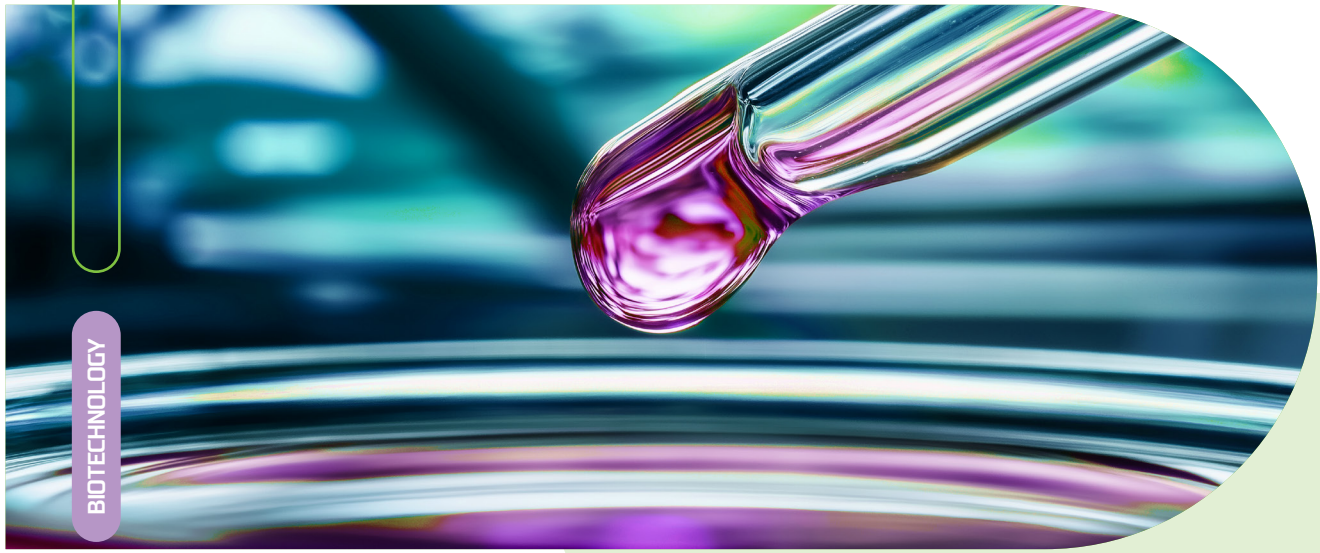
IN VITRO TESTING OF BIOLOGICAL SUBSTANCES

cytotoxicity study

testing of anti-inflammatory properties

testing of antioxidant properties

testing of antimicrobial properties

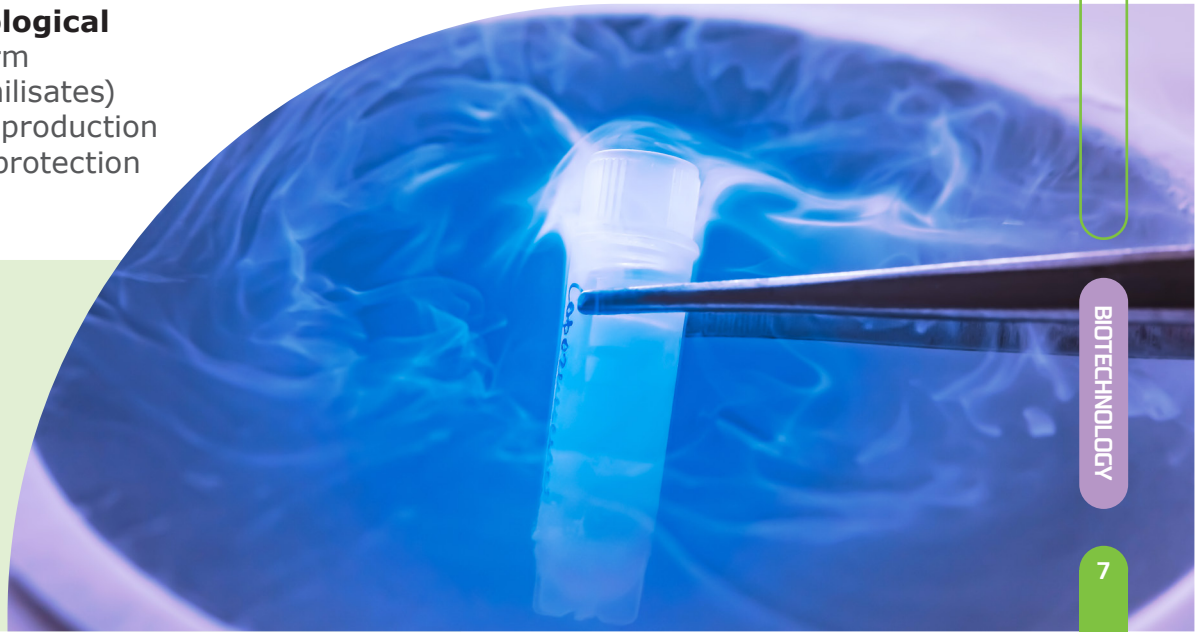


PREPARATION OF BIOLOGICAL MATERIAL FOR LONG-TERM STORAGE

control of stability of strains, preparation and maintenance of the RCB, MCB, JRC Cell Bank

preparation of biological material (in the form of biobanks or lyophilisates) for use in industrial production and environmental protection

performing lyophilisation according to existing protocol, development and optimisation of the lyophilisation process for different products

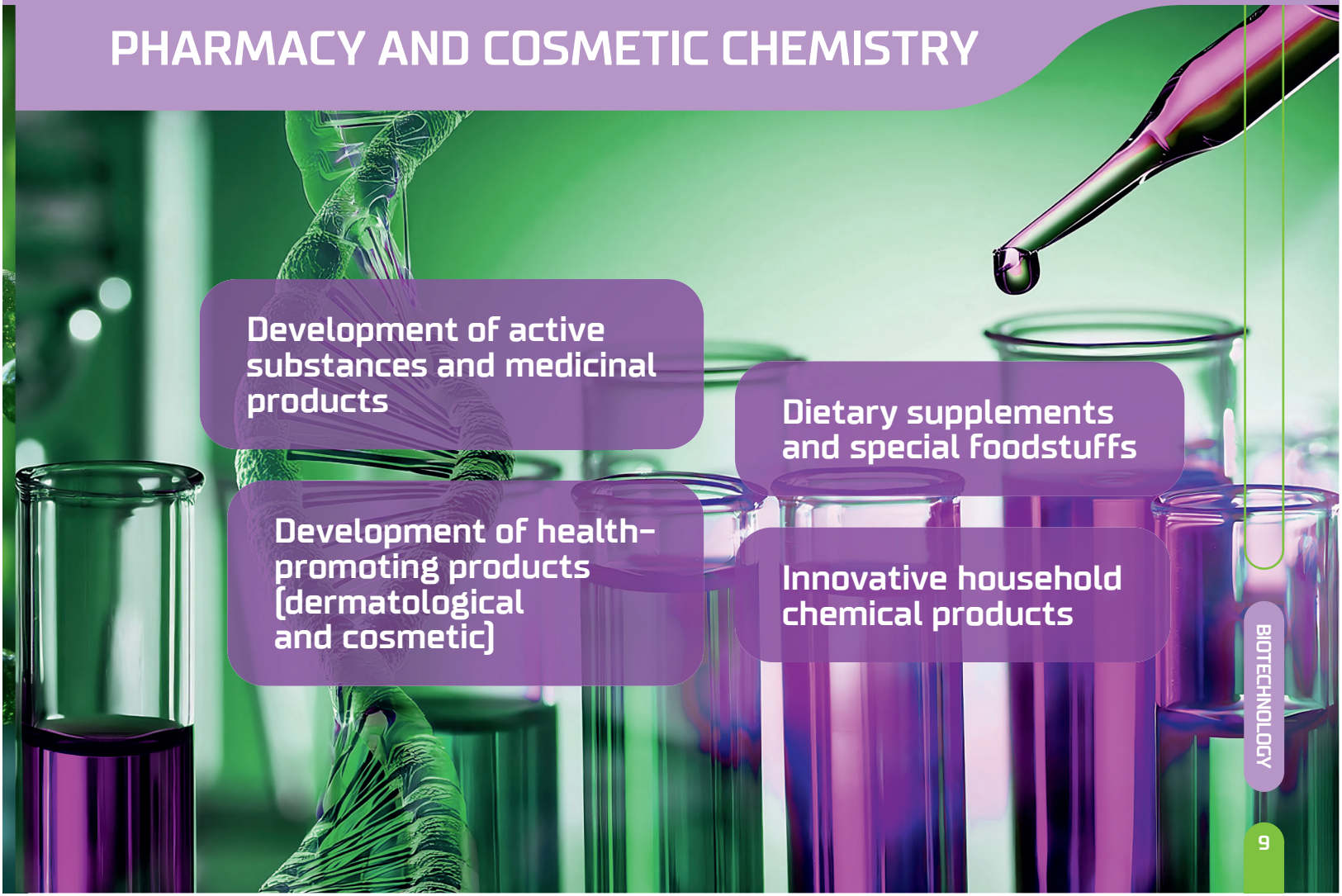


OTHER

fluorescence and confocal microscopy: preparation, observation and analysis of microscopic preparations

analysis and optimisation of biodegradation processes of organic materials (AMPTS III)

PHARMACY AND COSMETIC CHEMISTRY



Development of active substances and medicinal products

Dietary supplements and special foodstuffs

Development of health-promoting products (dermatological and cosmetic)

Innovative household chemical products

DEVELOPMENT OF ACTIVE SUBSTANCES AND MEDICINAL PRODUCTS

development of active substance (API) synthesis and technology pathways, production of API impurity standards, production of polymorphic forms for API substances

production of active substances (series from grams to several hundred kilograms)

innovative drug technologies, generic, generic with added value (combo products, new form / route of administration, reduced dose, modified release), biosimilars, biologics

new drug forms based on known substances

development of fixed dosage forms with modified release

development of technology and manufacturing of investigational medicinal product and placebo (solid dosage forms)

blinding and repackaging of the IMP, as well as storage and distribution to research centres

technological facilities for the manufacture of small batches of drugs (bioequivalence studies, rare diseases, orphan drugs)

waiver of bioequivalence studies

***in vitro – in vivo* correlation studies**

preparation of IMPD dossier

preparation of registration dossier (CTD) and others

implementation of the product into routine production in the GMP manufacturing area

post-authorisation changes to the marketing authorisation for medicinal products (full range of cooperation)

DIETARY SUPPLEMENTS AND FOODSTUFFS FOR SPECIAL USES

proprietary biologically active substances of natural, synthetic and biotechnologically modified

encapsulation systems for bioactive plant compounds, improved bioavailability of active substances, protection against degradation

controlled delivery and release technologies, transport systems for active substances

technologies based on pharmaceutical standards (quality certification, confirmed composition and purity, standardisation of active substances and production methods

personalisation of supplementation in response to the specific needs of different consumer groups

DEVELOPMENT OF PROHIBITIONAL PRODUCTS
(dermatological and cosmetic)

proprietary bioactive substances of natural origin, synthetic and biotechnologically modified

transport systems for active substances, protective systems for bioactive substances sensitive to degradation

cosmetic product development with Safety Report and registration in the CPNP system – placing the product on the Community market

cosmetic chemistry technologies for non-European markets

formulation modifications to meet changing legal regulations and consumer requirements

modern test methods for safety and efficacy assessment of the active substance and the finished cosmetic product, confirmation of marketing claims

assessment of the biological potential of substances and products (transdermal diffusion)

INNOVATIVE HOUSEHOLD CHEMICALS

ecological and safe product formulations with reduced irritant potential – reduction or elimination of chlorine, SLS and synthetic colours

effective ingredients – replacing traditional detergents with green products

hypoallergenic ingredients, without intense fragrances and aggressive substances

concentrates that reduce plastic and CO_2 emissions during transport

intelligent enzyme and probiotic formulas

2-in-1 or 3-in-1 formulas (e.g. cleaning, disinfecting and polishing at the same time) that reduce the number of products used)

minimalistic formulations *(clean label)*

products adapted to new technologies and household appliances

VALUES

We work with passion, based on:

- Professionalism
- Commitment
- Reliability
- Partnership

POTENTIAL

Product and process innovation

from pilot scale to production in our own process halls

Analytical and registration support

for APIs and non-APIs

Laboratories and equipment

developing research facilities with specialised laboratories and modern equipment

Process scaling

scale-up and scale-down of chemical and biotechnological processes

Development and competence

investment in technology and human resources with more than 170 scientists and specialists for companies investing in innovation

Inventions and know-how

patented solutions and know-how in the field of modern chemical processes that can be commercialised

Completion of technological line distributed on the market

from 'concept to product'

High standards

GMP, GLP, ISO systems in place

Research platform

implementation of R&D projects

Cooperation with leaders

cooperation with Polish and foreign business and academic partners

Łukasiewicz
Industrial Chemistry Institute

**We create innovations
that shape a sustainable future.
Trust our knowledge and experience!**

LET'S MEET!

**Łukasiewicz Research Network
Industrial Chemistry Institute**

8 Rydygiera St.
01-793 Warsaw, Poland
ichp.lukasiewicz.gov.pl/en

**Jolanta Janiszewska, PhD Sc. Eng.
Pharmacy, Cosmetic Chemistry and
Biotechnology Research Group**

+48 604 422 011 | +48 517 883 174
jolanta.janiszewska@ichp.lukasiewicz.gov.pl

FOLLOW US / / /