

# Reasonable scenarios for successful Russian - German co-operation

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# Institute for Genetics and Selection of Industrial Microorganisms (Genetika)

- **State Scientific centre of Russia**
- **Foundation: 1968**
- **Staff: more than 100 PhD scientists**
- **Structure units:**
  - ✓ 20 Research Laboratory
  - ✓ National Collection of Industrial Microorganisms
  - ✓ Service Analytical Center
  - ✓ Russian Journal of Biotechnology



# Focus of Research Activity

**Creation of microbial strains and cell cultures, and development on their basis of the processes for production of bio-based chemicals and pharmaceuticals**

# Main advantages of Genetika for development of new processes and products

## ◆ *Biodiversity*

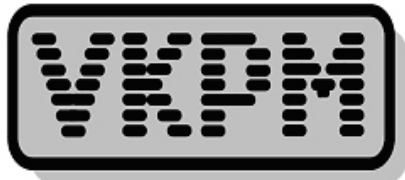
- Study of nature population of microorganisms
- Development of screening programs
- Collection of microorganisms

## ◆ *Design of strains*

- Genetics of different microbial groups
- Mutagenesis and Selection
- DNA technologies (gene engineering, PCR, DNA shuffling)

## ◆ *Controlled fermentation*

# Russian Collection of Industrial Microorganisms (VKPM)



*Member of International (WECC) and European (ECCO)*

*Federation of Microbial Collections*

*National Collection of Russia*

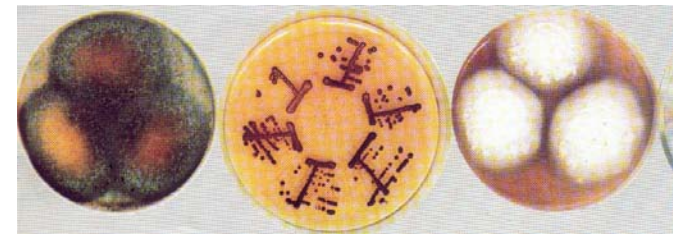
*International Depository*

## **VKPM deposits:**

**More 17 000 strains of non-pathogenic microorganisms**

**More 9 000 strains of industrial microorganism**

**More 6 000 genetic market strains**



# BioTechnologies from Genetika Really Used in Industry

## Acrylamide

Stockhausen, Russia  
Asahi, Korea

## Threonine

Ajinomoto, France  
Slovenia, Chine

Industrial enzymes,  
Russia

Peptide substrates  
for diagnostics,  
Russia



## Riboflavine

Russia, Chine

Interferon  $\alpha 2$ ,  
Chine, Russia

Interleukin  $1\beta$ ,  
Russia

# Paradox of Large - scale IB in Russia

- Absence of cheap sugar feedstocks for industrial biotechnology
- Availability of significant quantities of cheap wheat (not more than EU100 per ton)

# Subjects for Russian-German co-operation

1. Wheat processing into to glucose syrup as major renewable sugar feedstocks for industrial biotechnology
2. Generation of the list of bio-based products perspective for Russia and Germany with high export potential

# Biocatalytical routes to monomer production

Development of alternative approaches to production of monomers via biocatalysis and fermentation of renewable raw materials

# Main groups of monomers

## Monomers obtained by fermentation

- Lactic acid
- Succinic acid
- Itaconic acid
- 1.3-PDO
- Butanol

## Monomers obtained by biocatalysis

### Acrylic monomers

- acrylamide
- acrylic acid and its salts
- N-substituted acrylamides

# Biotechnological Routes to Monomer Production

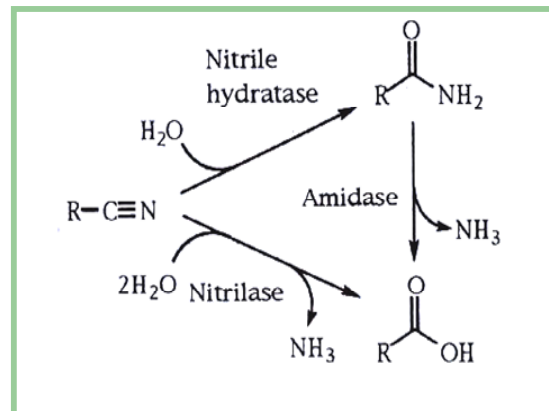
## Enzymatic conversion of nitriles and amides

### Acrylic monomers

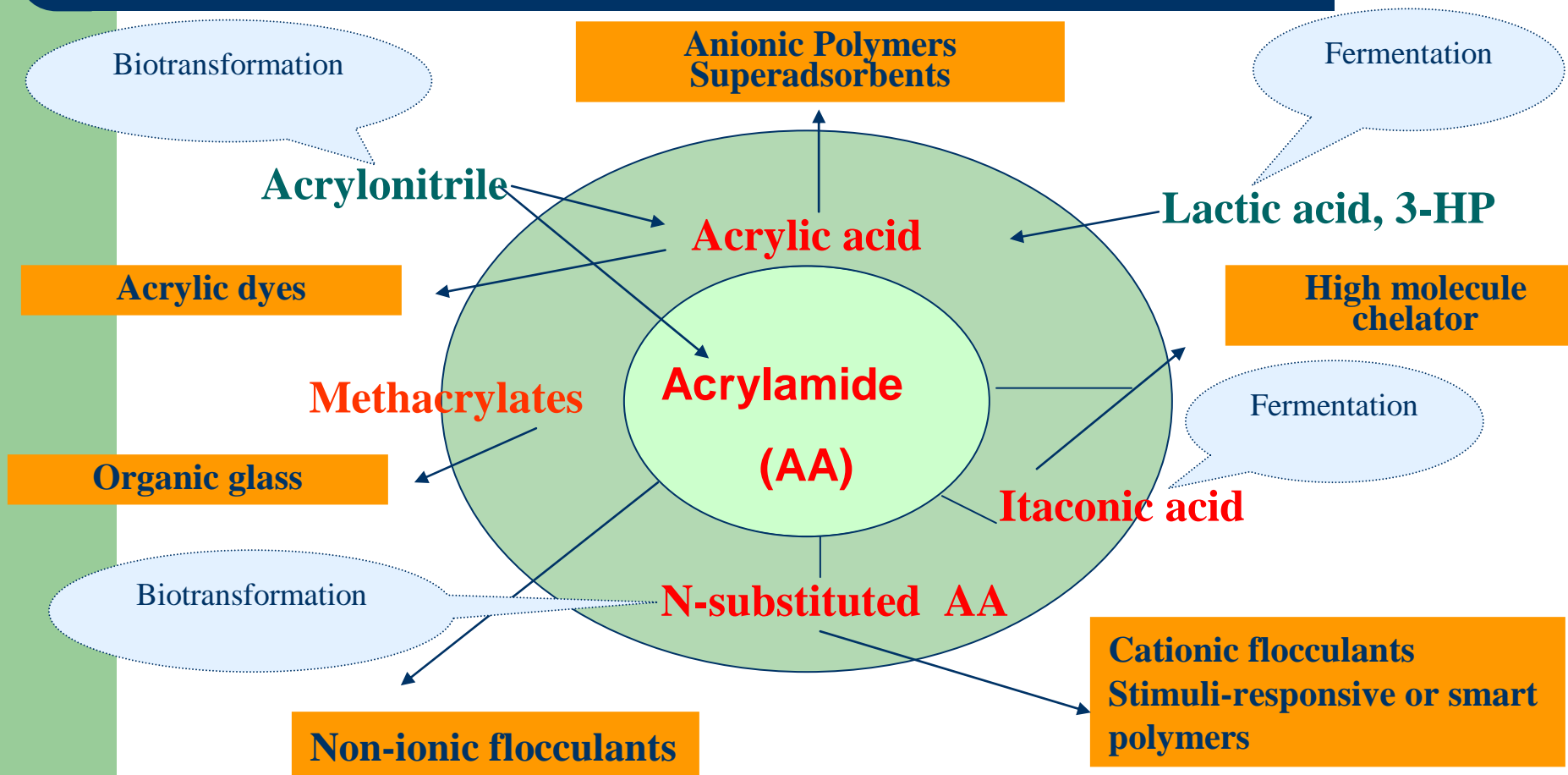
- *Acrylamide*
- *Acrylic acid*
- *N-substituted acrylamide*

### Polyacrylamides

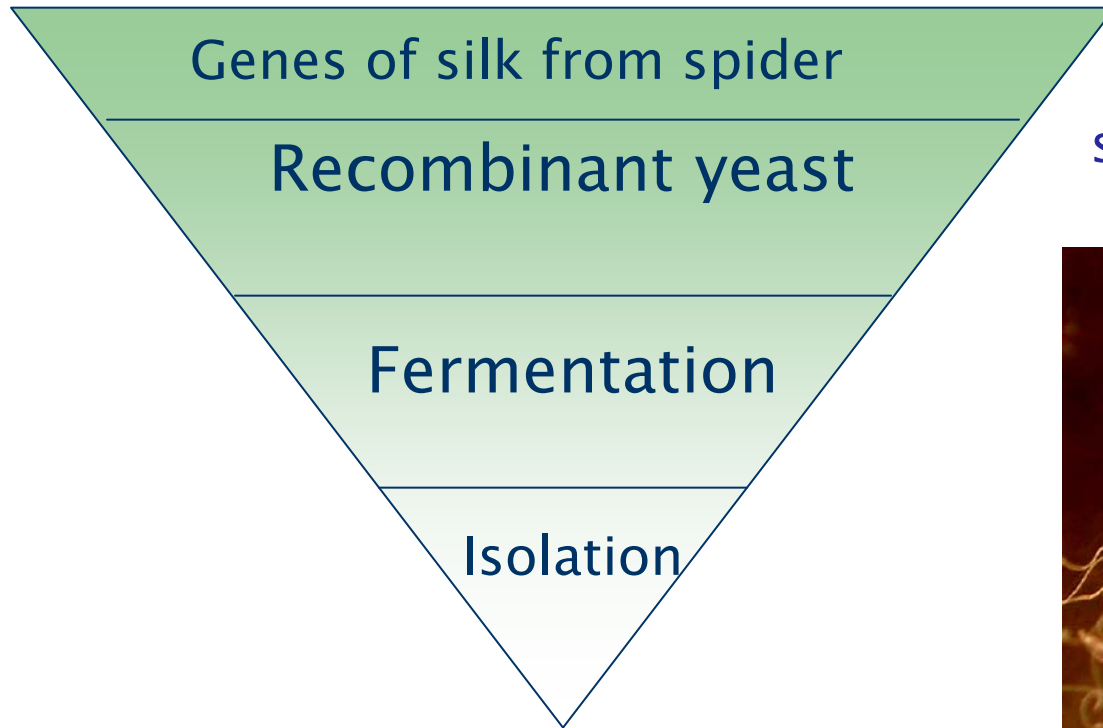
### Flocculants



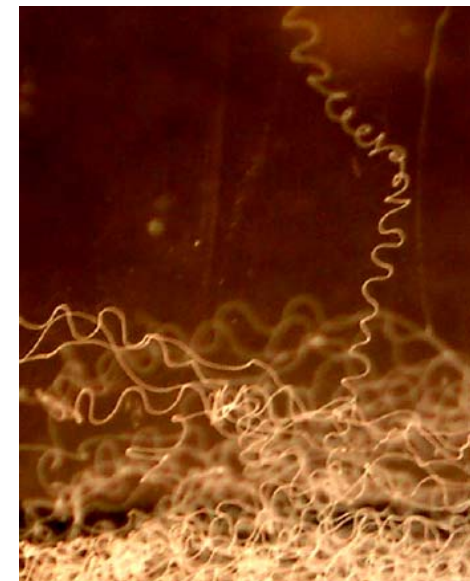
# Monomers obtaining by bioprocesses and their application



# New biomaterials: artificial spidroins from recombinant microbes and plants



Spidroin fibers from recombinant yeast



Fiber spinning

# Prerequisites for mutual cooperation

- ❖ Genetika has large experience on development of industrial technologies and their implementation
- ❖ The great experience of work with different microorganisms, highly qualified staff and good equipment is the excellent basis for successful cooperation