

**NOVEL BIOCIDES PREPARATIONS FOR
THE PROLONGED DESINFECTION
OF WOUND DRESSINGS, SANITARY
MATERIALS AND CLOTHES**

Scope: nanobiotechnology and nanomedicine



PROJECT DESCRIPTION

- New effective light- and thermo-resistant biocide preparations (so-called “nanoantibiotics” of a new generation) are proposed for the treatment and prolonged disinfection of wound dressings and sanitary materials, clothes and military camouflage, and also for disinfection of fish aquariums (or ponds) and pools



RELEVANCE OF THE PROBLEM

They are mainly organic substances,
toxic for people and environment

Traditional biocide preparations of
medicinal, industrial or everyday
application

Side effects

Allergies

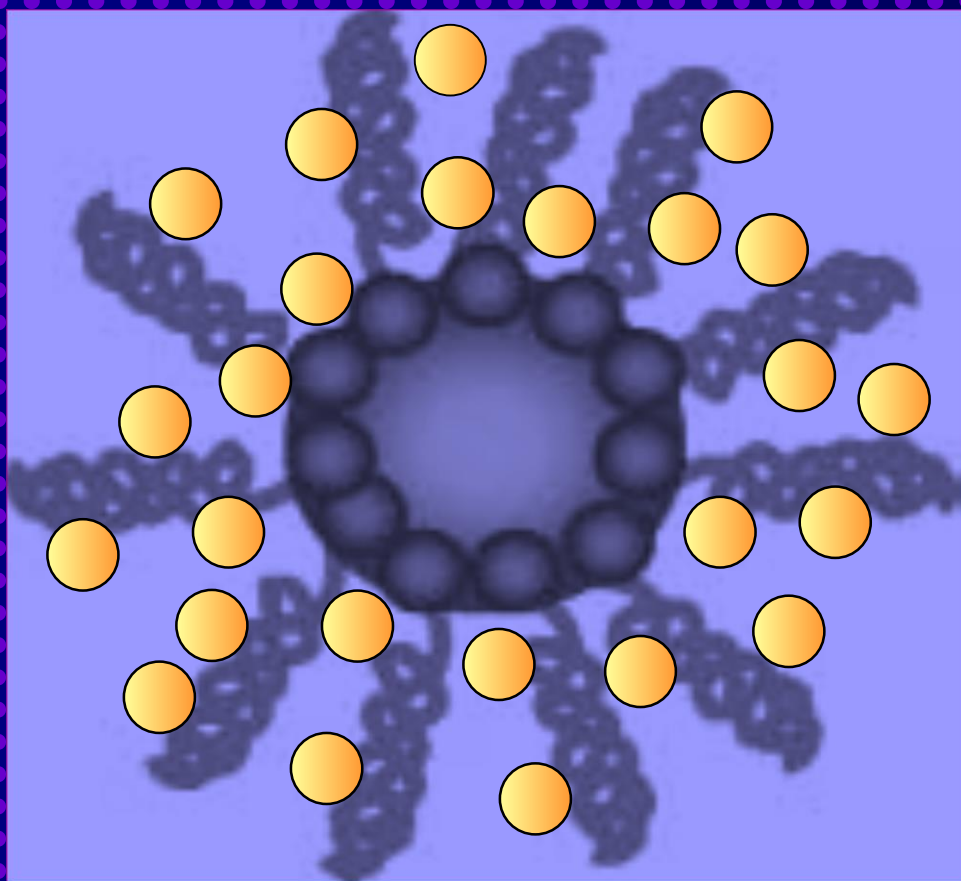
Resistance



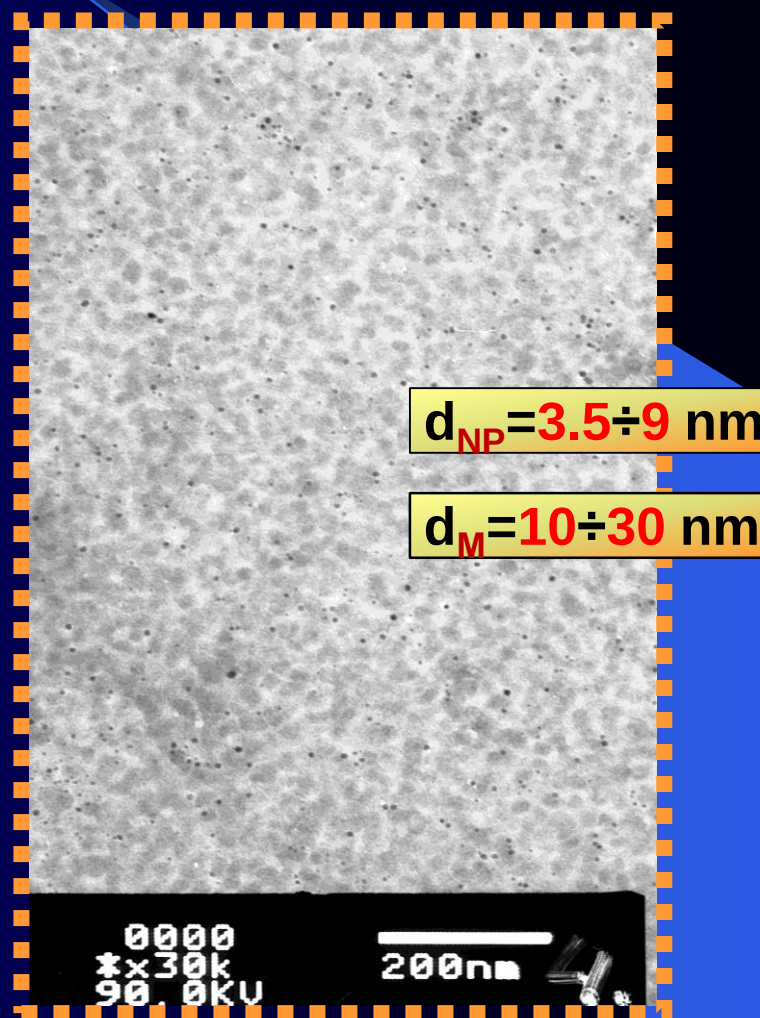
PROJECT IDEA: to create novel biocide preparations based on polymer/inorganic hybrids and metal nanoparticles with a wide antibacterial, antimicrobial and antifungal action, with respect to which microorganisms do not develop resistance

IMPLEMENTATION:

Polymer/inorganic matrix with spherical metal nanoparticles



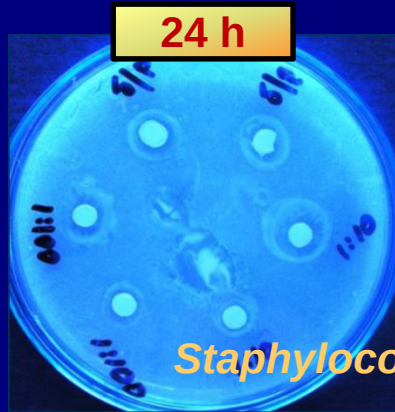
Morphology of preparation in water: **electronic microscopy**



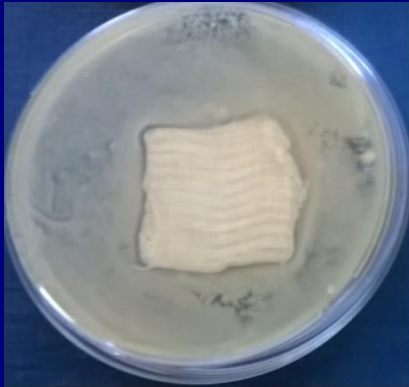


BIOLOGICAL ACTIVITY to traditional hospital infections

Biocide action on *Staphylococcus aureus* (aurococcus) and *Pseudomonas aeruginosa*



Cotton fabric impregnated with a preparation

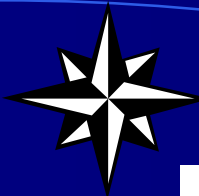


Patent for invention
allowing using the
preparation for fish
aquarium (or pond)
disinfection

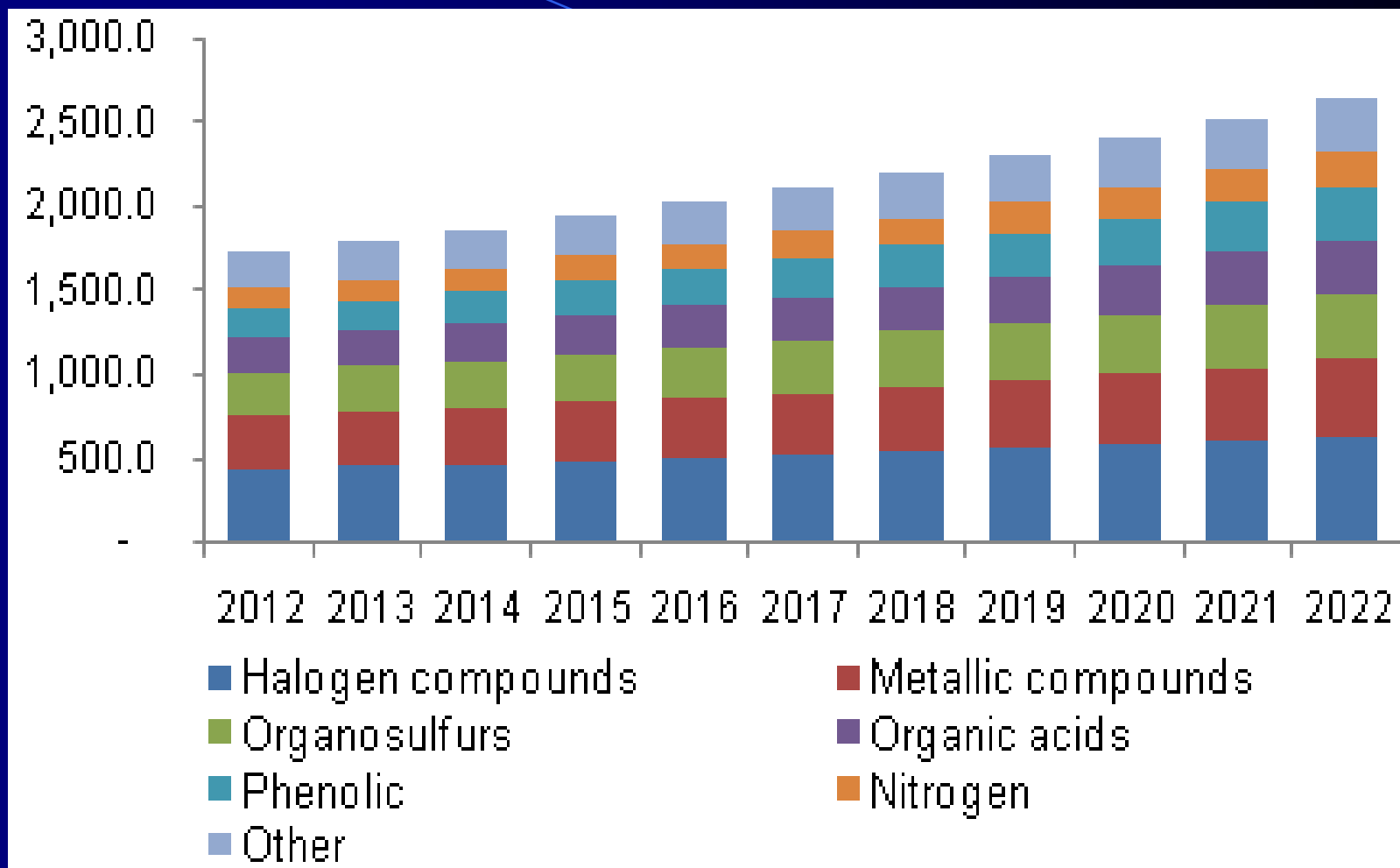
Staphylococcus aureus *Pseudomonas aeruginosa*

The preparation show fungicidal and fungistatic action
on the culture of filamentous fungi: *Cladosporium
sphaerospermum* and *Fusarium oxysporum* for 30 days





GLOBAL BIOCIDIDE MARKET

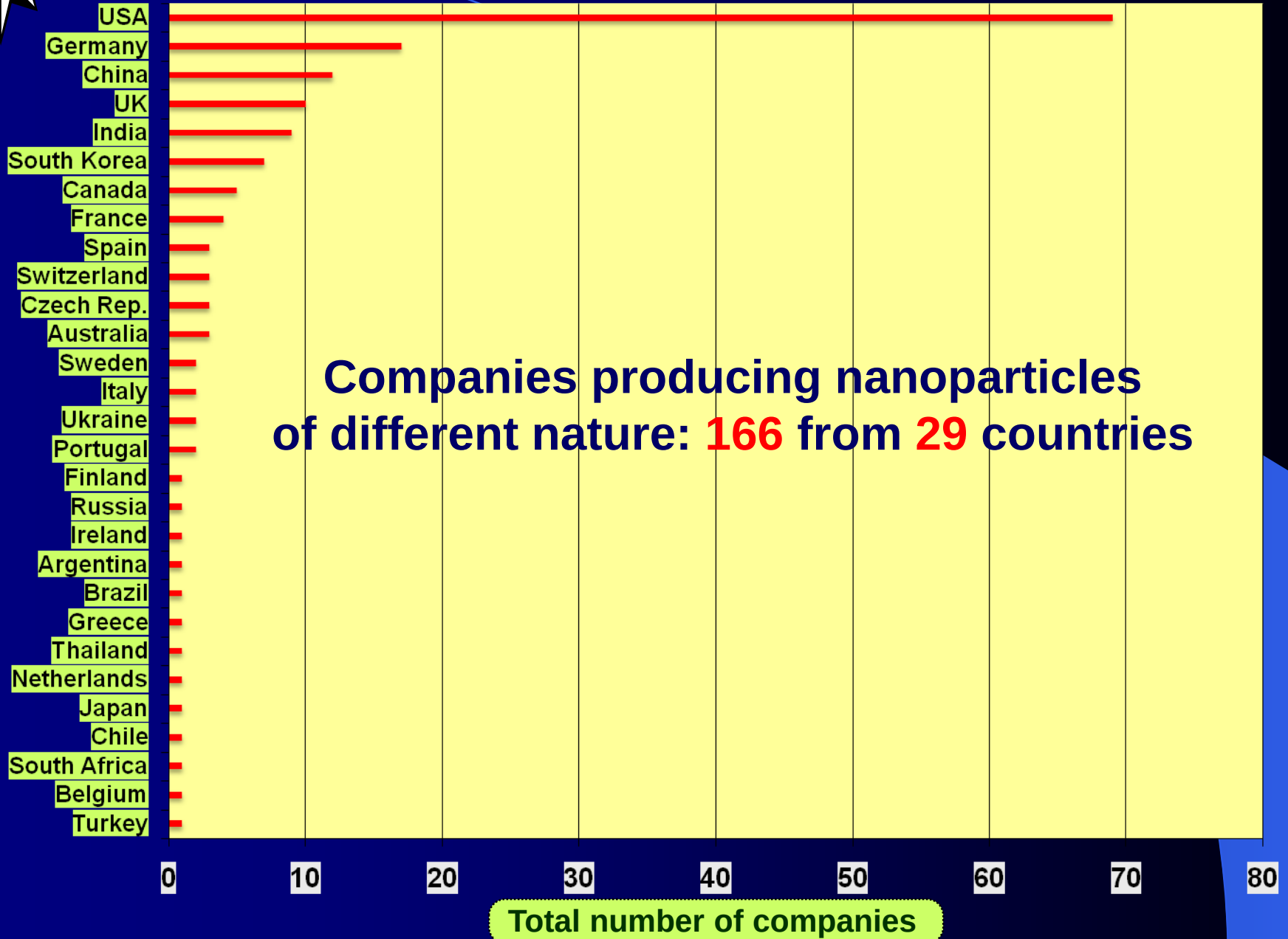


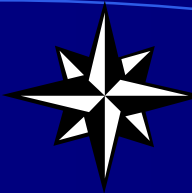
Total biocide market - USD 7.99 billion in 2014

Biocide market based on metallic compounds constituted USD 1.5 billion in 2014

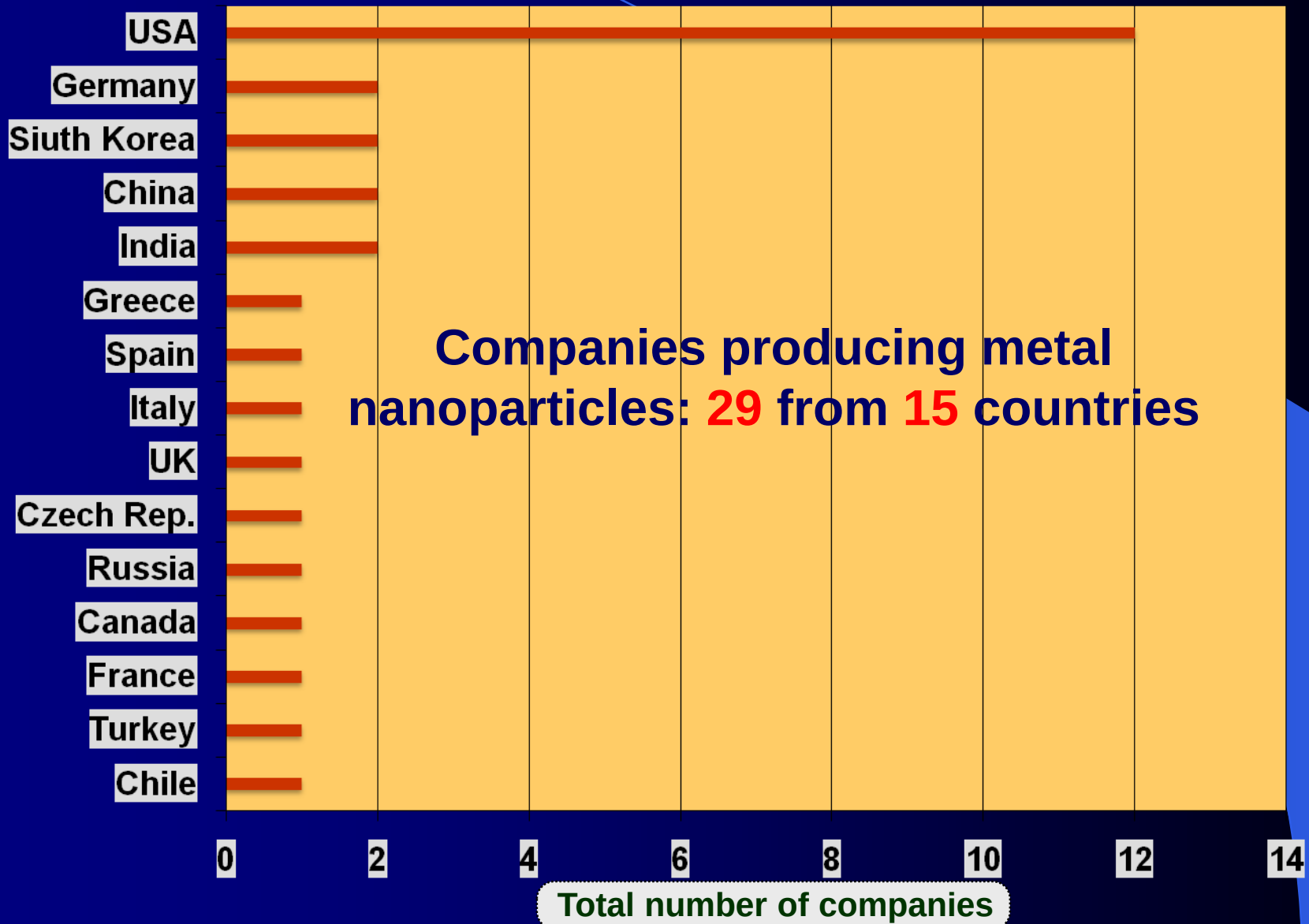


WORLD MARKET OF NANOPARTICLES





WORLD MARKET OF METAL NANOPARTICLES





COMPETITIVE ENVIRONMENT

Companies producing alternative polymer/inorganic hybrids

NanoHybrids (USA)

Hybrid Silica Technologies (USA)

Companies producing similar metal nanoparticles but with other stabilizers

Ras materials (Germany)

Bio-gate (Germany)

Nanocs (USA)

Ferro (USA)

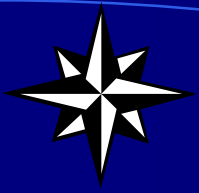
Auto Fibre Craft (India)

ABC Nanotech (South Korea)

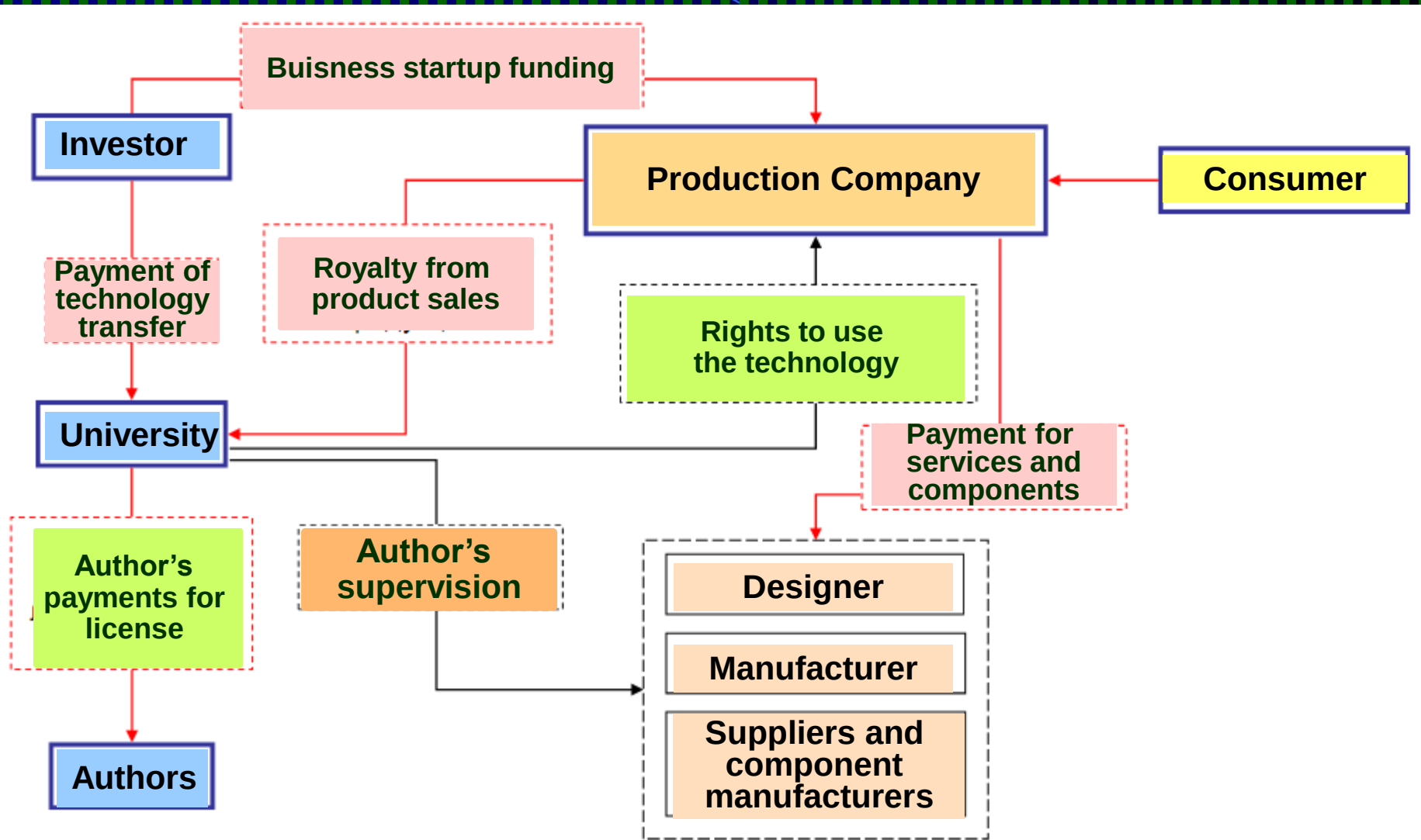
Nano-Tech Polska (Poland)

Nanogرافي (Turkey)

Nanoindustry (Russia)



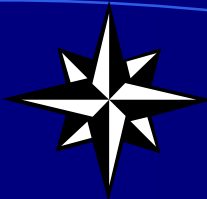
BUSINESS-MODEL FOR TECHNOLOGY TRANSFER - LICENSING





ADVANTAGES OF OUR “NANOANTIBIOTICS”:

- they contain biocompatible nontoxic components and very small (< **10** nm) metal nanoparticles;
- possess a high biocide activity against numerous bacteria, fungi and viruses;
- are stable in time (up to 2 years) and are resistant to the light and temperature action;
- retain their bactericidal/fungicidal effect to very low concentrations;
- show a high adhesion to wound dressings and tissues of various natures;
- their solutions could be used as spray for processing of linen, clothes and camouflage;
- comprise components, which are widely available, that allows quickly adjusting their production in Ukraine;
- could widely be applied as biocide agents for disinfection of fish aquariums or ponds without any biological risks.



PROJECT TEAM

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Technology transfer for producing novel biocide preparations

National University of Life and
Environmental Sciences of Ukraine

Scientific and Educational
Center “Institute of Biology”



V. Maksin



O. Kravchenko



T. Kondratiuk



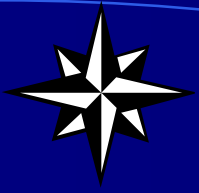
O. Morgaienko

Testing the biocide action of novel preparations *in vitro* and *in vivo*



EXECUTION STAGES AND BUDGET

The main stages and their content		Execution period, months	Costs, mil hrn
1	Technology formalization in the form of Technical Specifications (TS)	4	0,3
2	Producing and characterization of a pilot batch of the biocide preparation; obtaining wound dressings and spray on its basis	8	2,1
3	Testing the biocide activity of pure preparation, dressings and spray with respect to traditional hospital infections and filamentous fungi	9	0,9
4	Testing the preparation toxicity <i>in vitro</i> and <i>in vivo</i> (including genotoxicity)	9	0,9
5	Correction of TS and transfer of rights to use the technology of producing preparation, biocide materials and spray	3	0,3
Total:		24	4,5



Many thanks for your attention!

**National Taras
Shevchenko
University of Kyiv**

