

nano and micro architecture

Tomáš Těthal



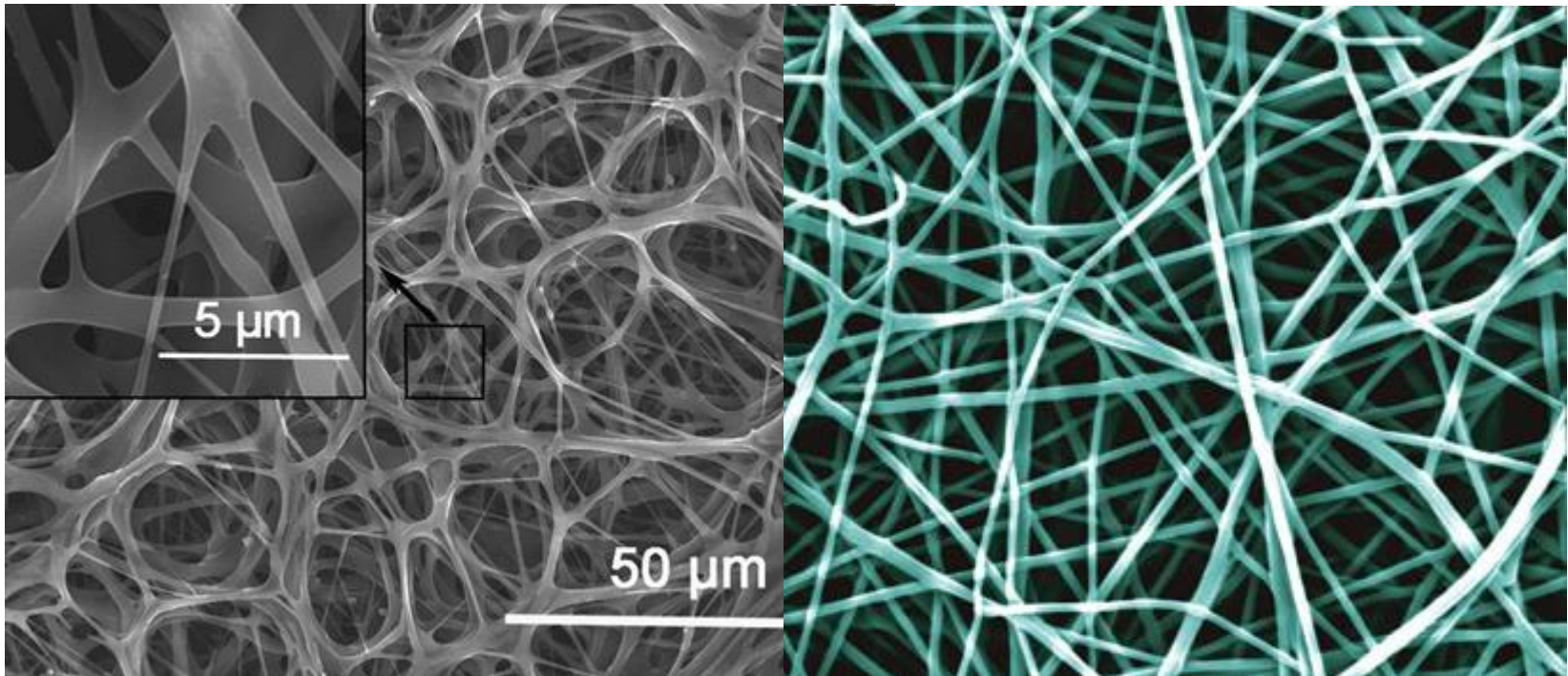
COMPANY PROFILE

- **IQ Structures s.r.o.**

- Star up company, 3,5 years on the market
- Own nanocenter built in Brno, Production in Jablonec, Head office n Prague
- Cooperation with Czech Academy of Science
- Business model - add value and functionality to the plastics, metallic and ceramics materials,
- Micro and nanostructured materials which reach the needs of our customers
- Company is mainly financed from private capital of shareholders
- Cooperation partners from Europe and USA
- 2015 year revenue around 75 mil. CZK, first profitable year



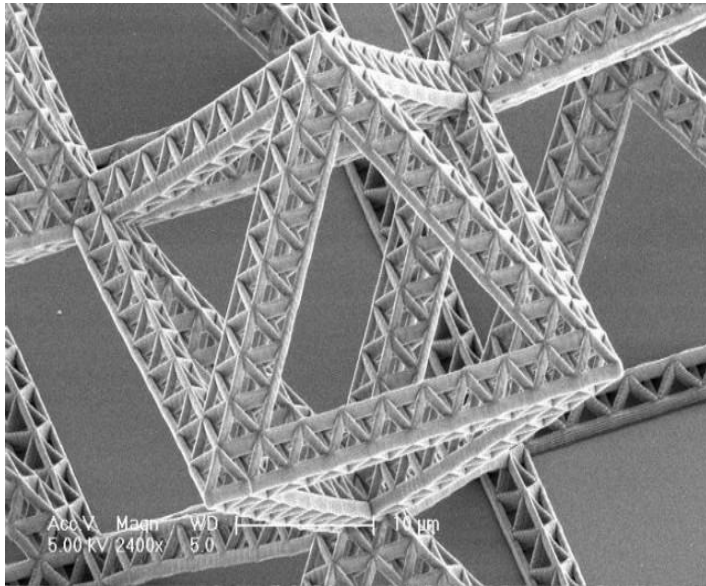
MORE THAN RANDOM NANOSTRUCTURES



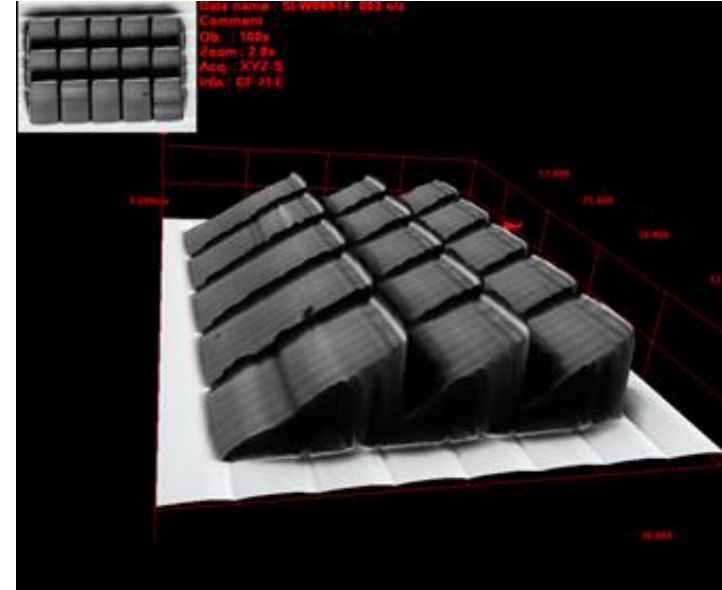
CONTROLLED ARCHITECTURE

- Nano and micro structured materials
- Detail size from 10 to 20 000 nanometers
- Mass production !

volume



surface

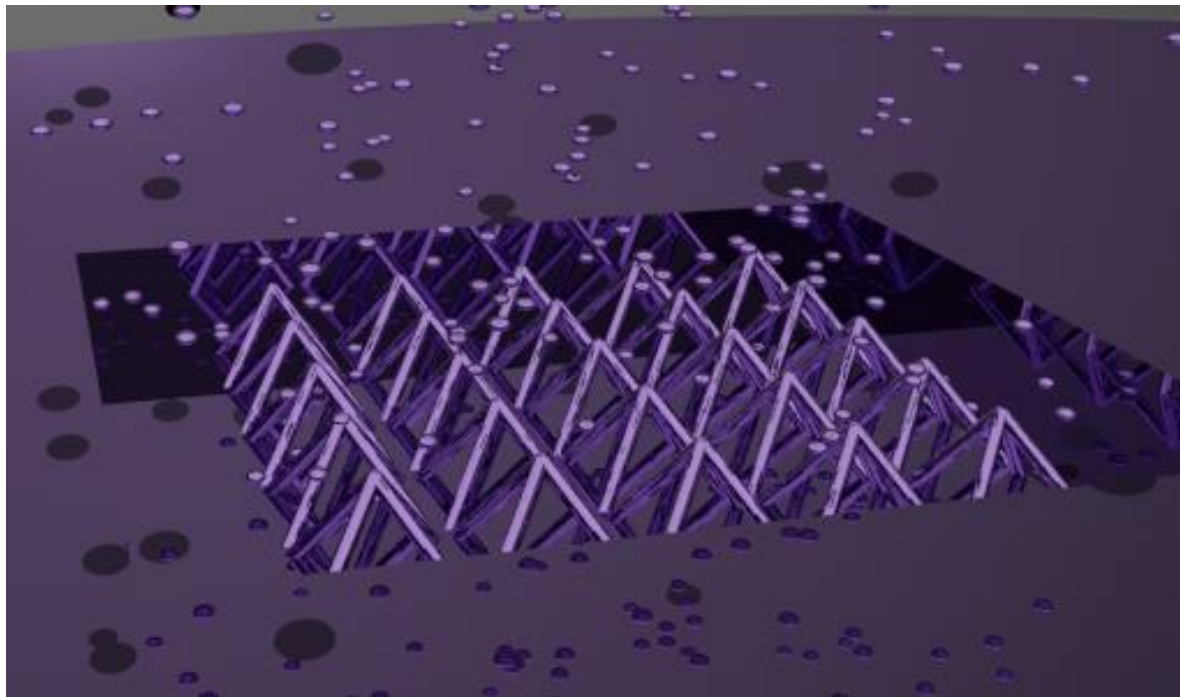


THE PRODUCTION PROCESS



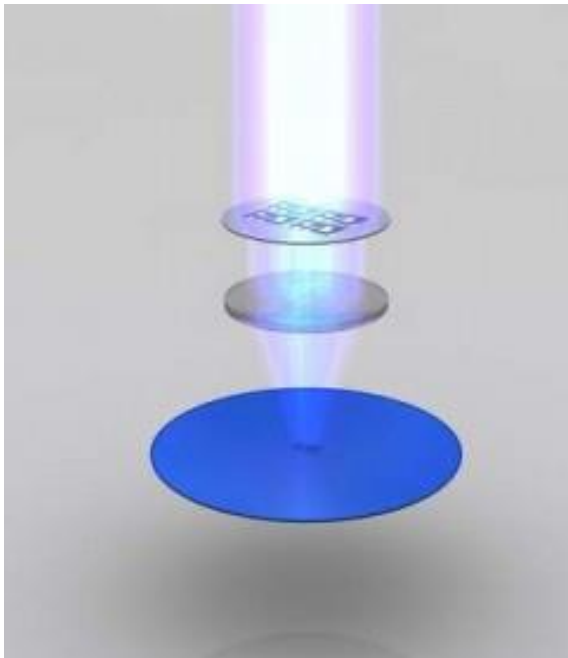
HOW TO MAKE A MASTER

- **1) Lithographic process**
 - **Master production with controlled removal of material**

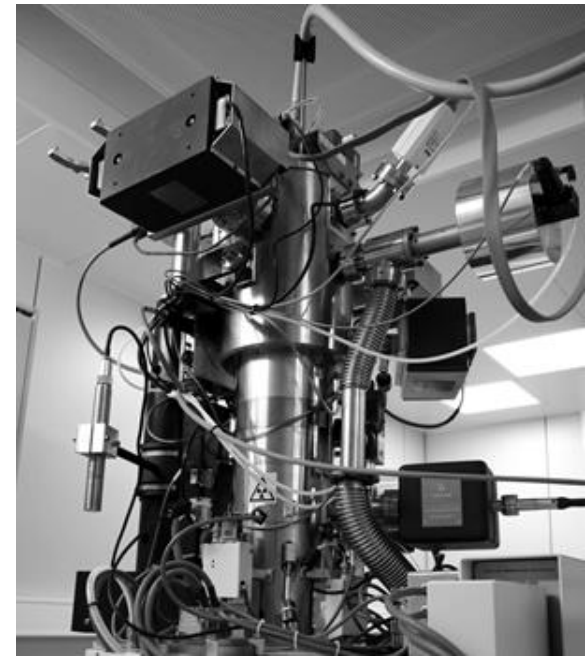


LITHOGRAPHY TECHNIQUES

UV lithography

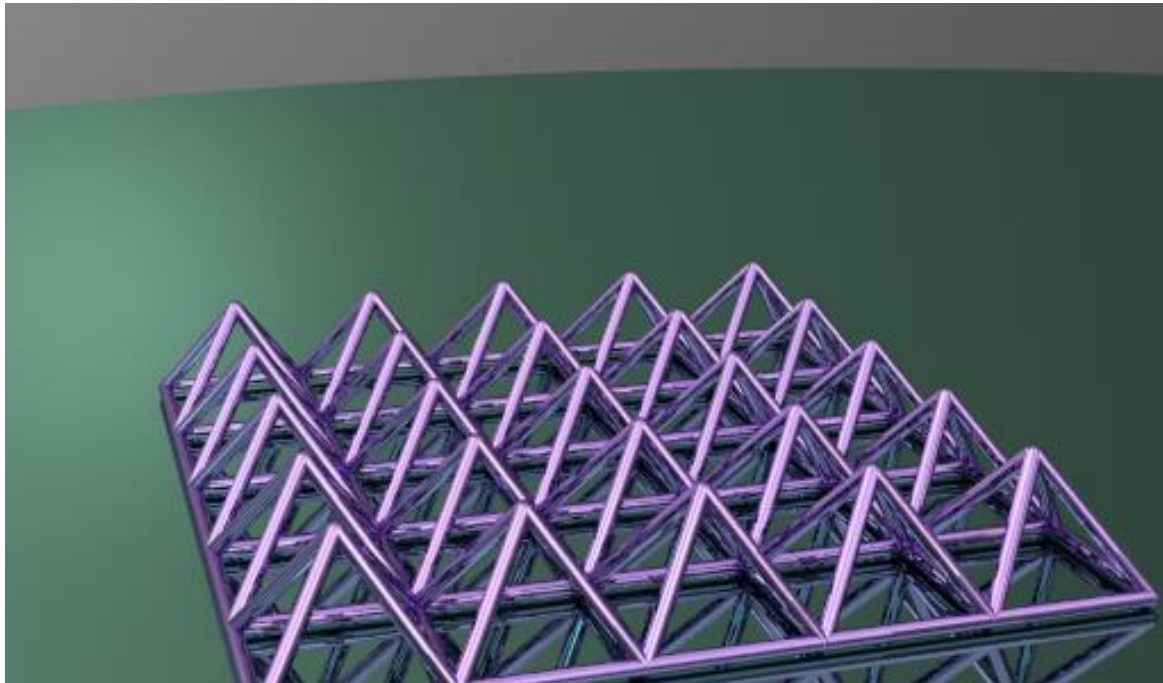


Electron beam lithography



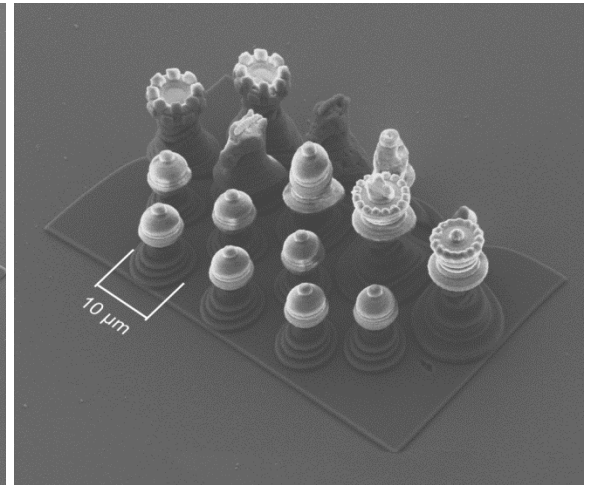
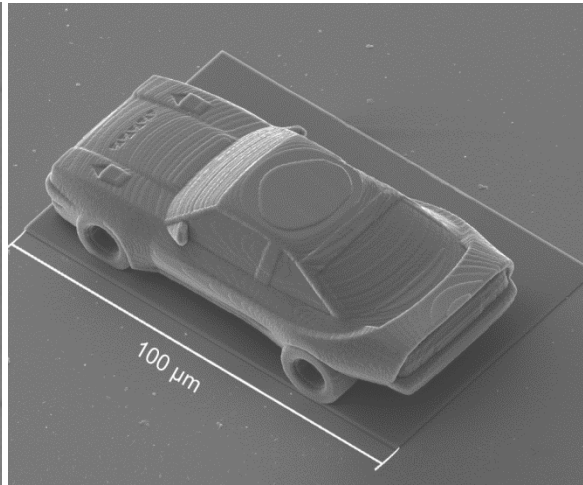
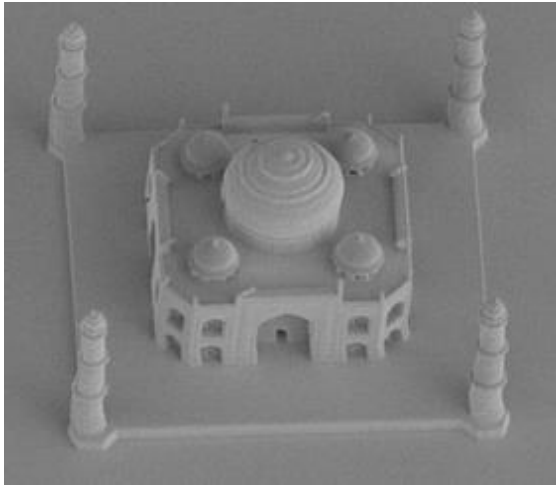
HOW TO MAKE A MASTER

- **2) 3D nano printing process**
 - **Master production with controlled addition of the material**



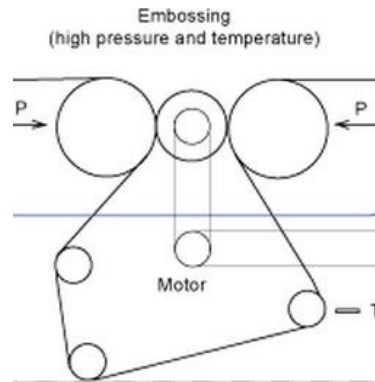
3D NANOPRINTING

- **Technology and machine developed in Czech Republic**

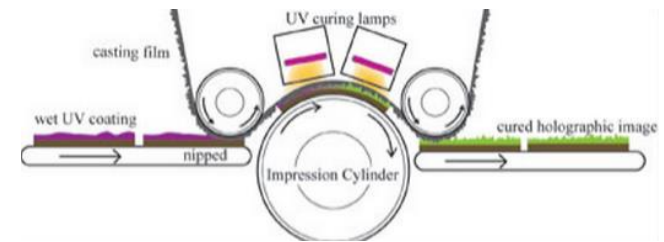


HOW TO MASS REPLICATE NANOSTRUCTURES

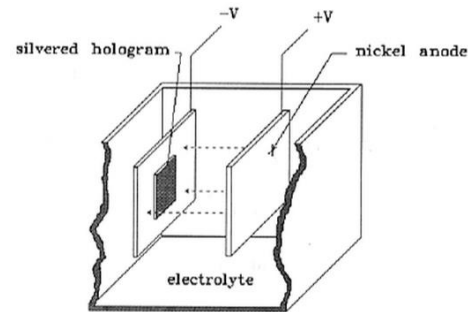
Embossing into the plastics



UV casting



Electroforming

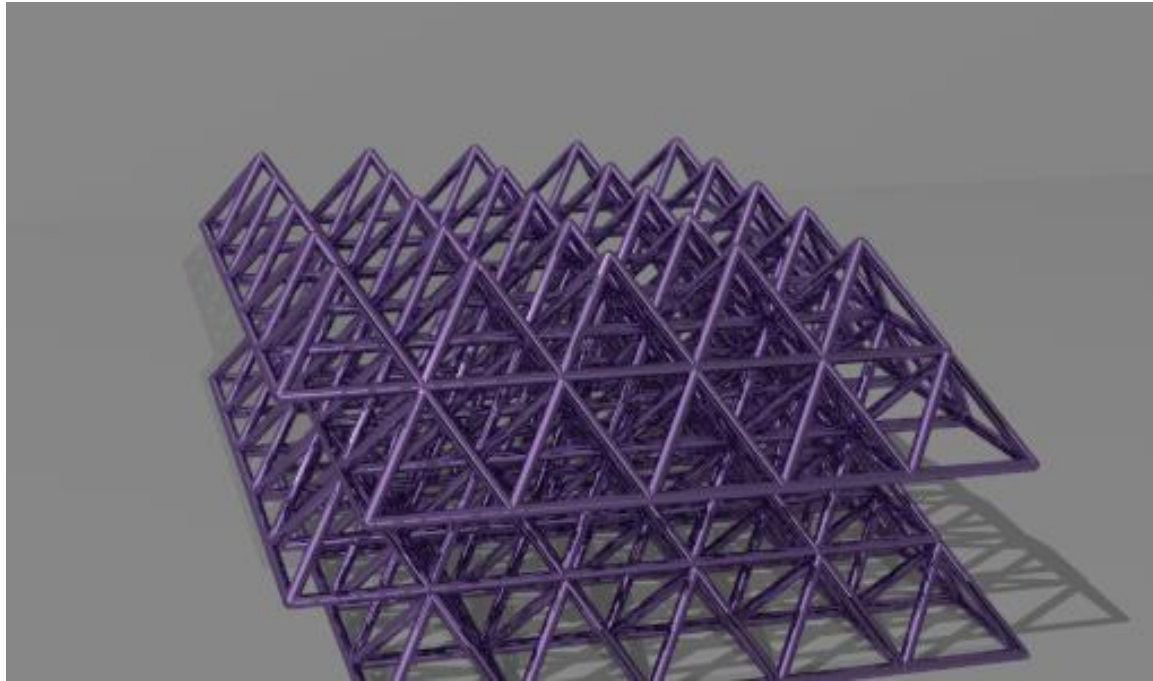


Ceramic casting

Special multiplication of 3D structures



SPECIAL MULTIPLICATION OF 3D STRUCTURES



WHERE TO USE NANO AND MICRO STRUCTURED MATERIALS

- Security products against the counterfeiting
- Technical products



SECURITY PRODUCTS

- **Optical security features – visual security**

Protection against counterfeiting, brand protection.

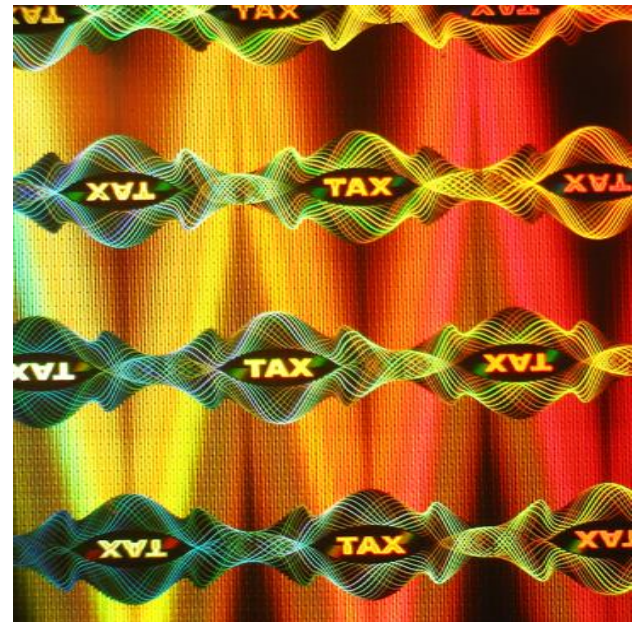
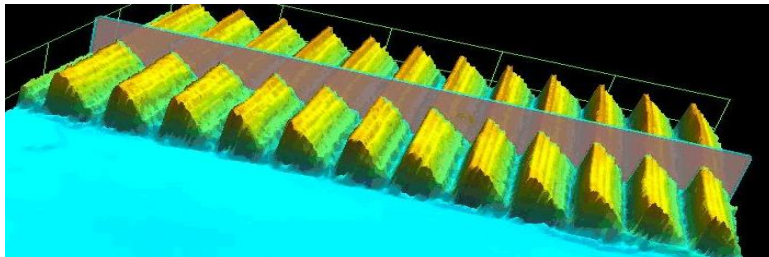
Theft prevention.

Excise tax recovery.

Systemic protection and Track & Trace.

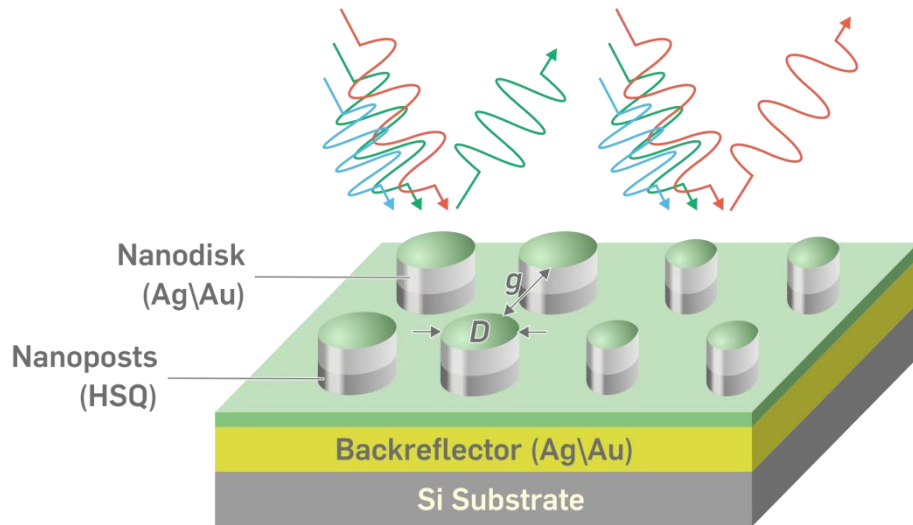
Project management and consulting.

New customized technology development.



SECURITY PRODUCTS

- Plasmonic structures – marked microparticles



SECURITY PRODUCTS

- Fuel marking, tax revenue protection,



TECHNICAL PRODUCTS

Flat optics.

Tissue and organs replacement.

New materials.

Micromechanics.

Microchemical processes.

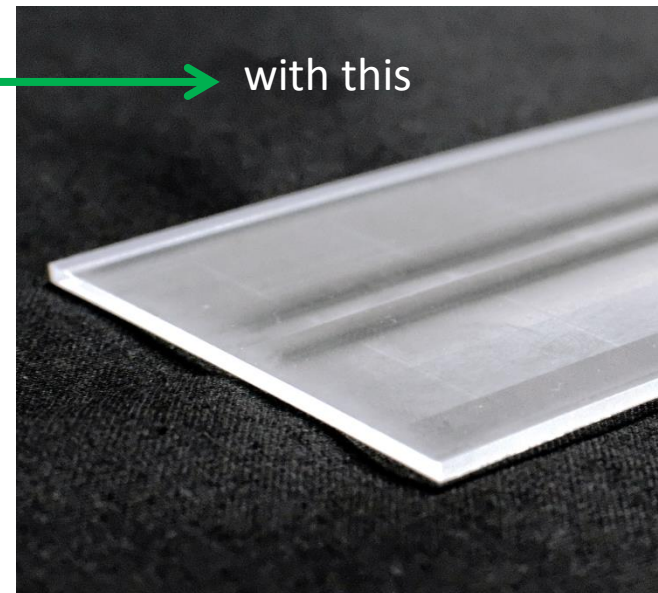
Printed electronics.

Other applications.



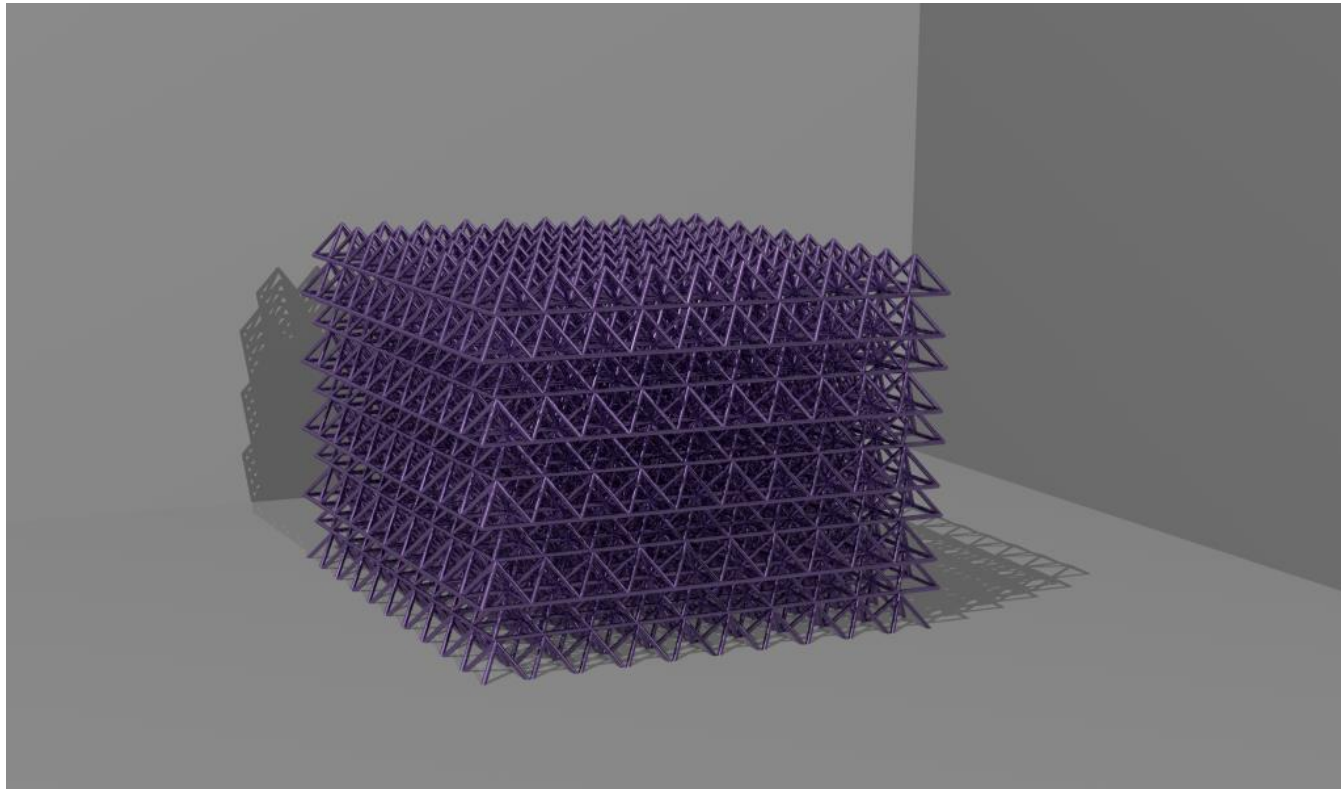
TECHNICAL PRODUCTS

- Flat optics



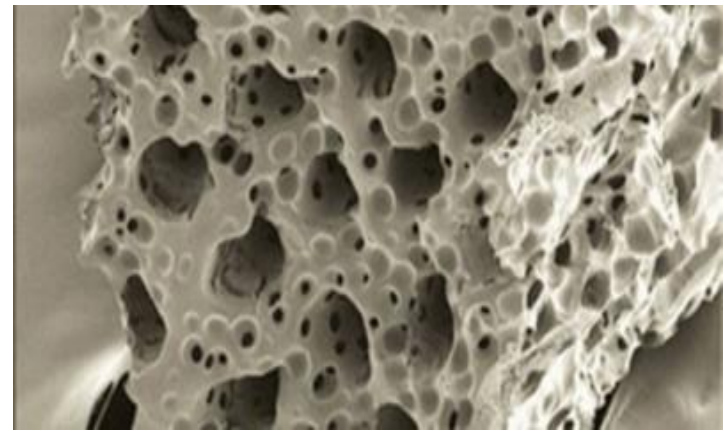
TECHNICAL PRODUCTS

- **New materials**



TECHNICAL PRODUCTS

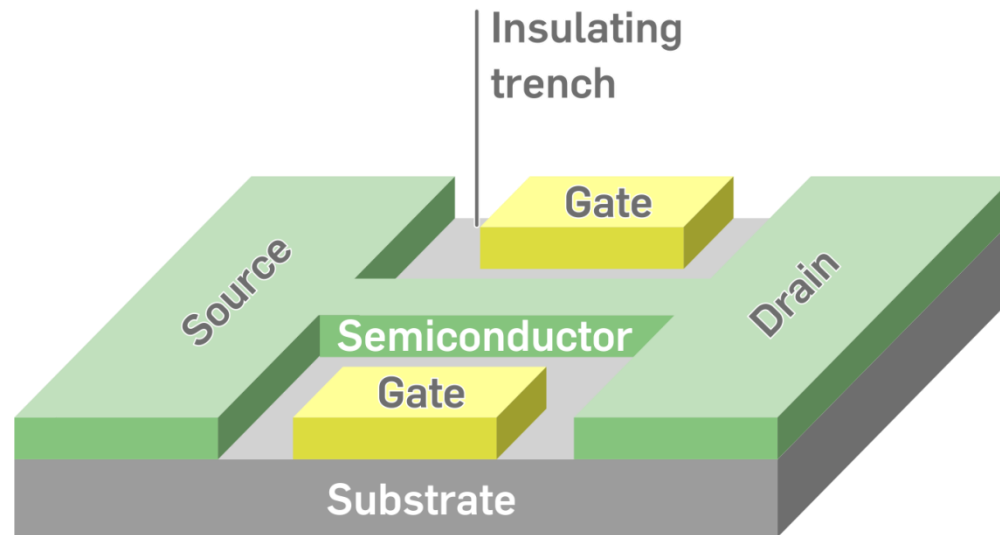
- Tissue and organs replacement



TECHNICAL PRODUCTS

- Printed electronics

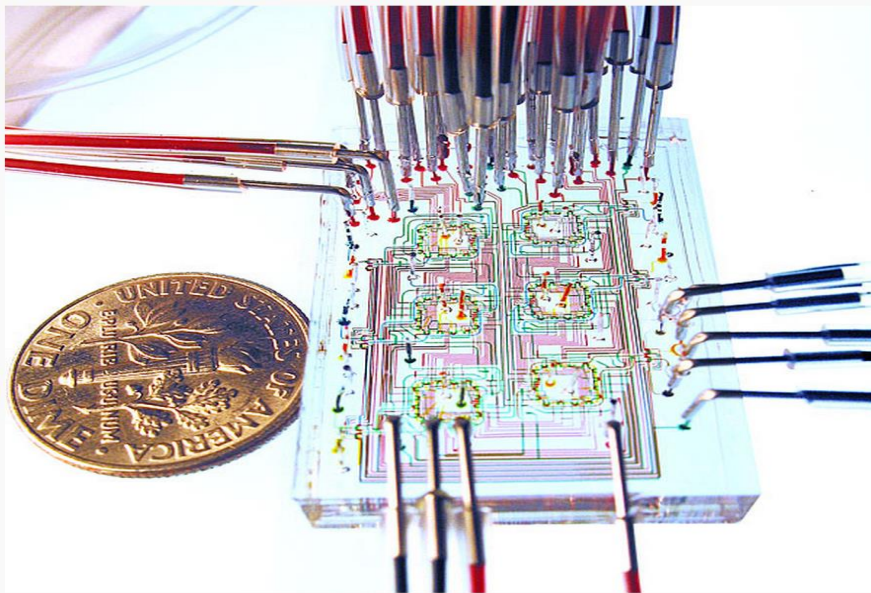
PragmatlC Planar Nano-Transistor (PNT)



TECHNICAL PRODUCTS

- **Microchemical processes**

Microchemical production

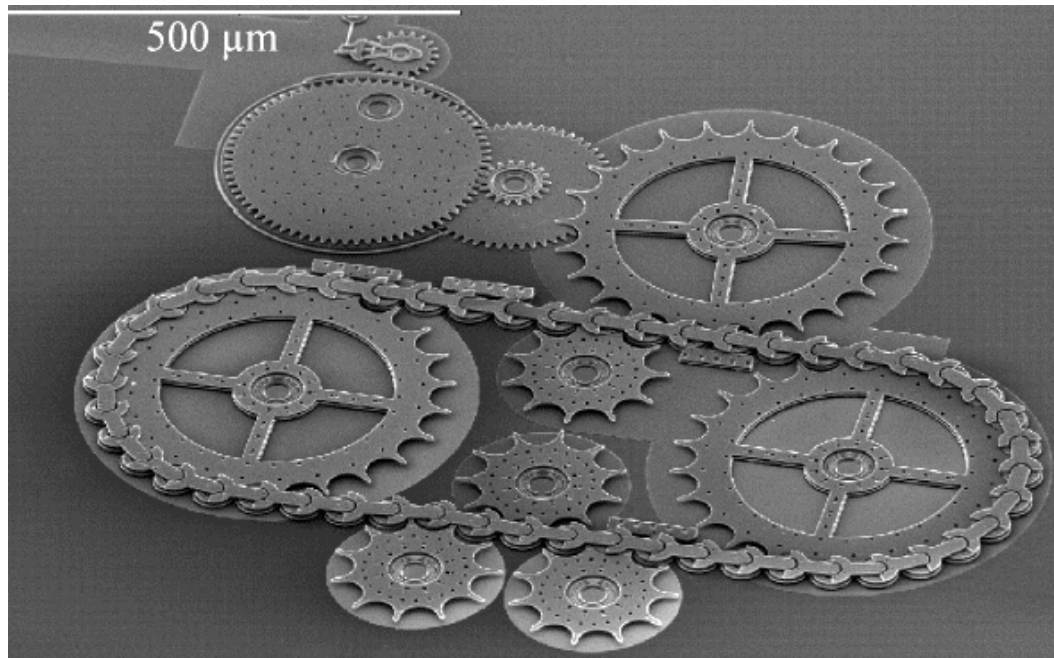


Sensors



TECHNICAL PRODUCTS

- **Micromechanics**



TECHNICAL PRODUCTS

- **Other applications**

Surface finishes (wrapping, hydrofobity).

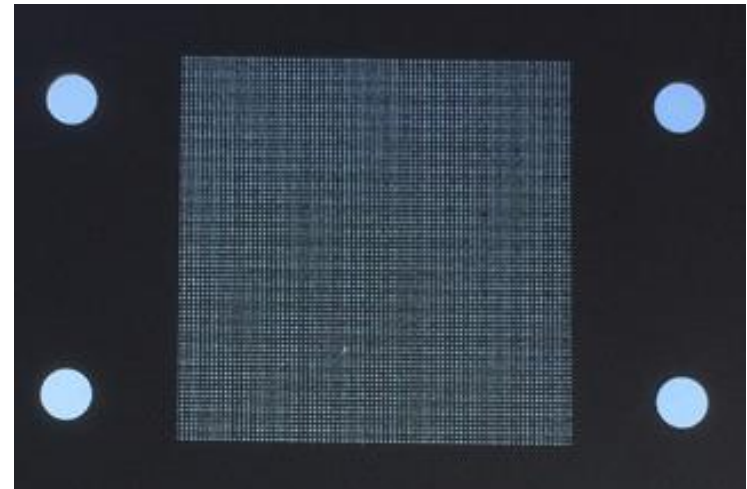
Structured surfaces for catalytic processes.

Special electrodes.

Displays.

Optical chips.

etc.



NOT THE FIRST

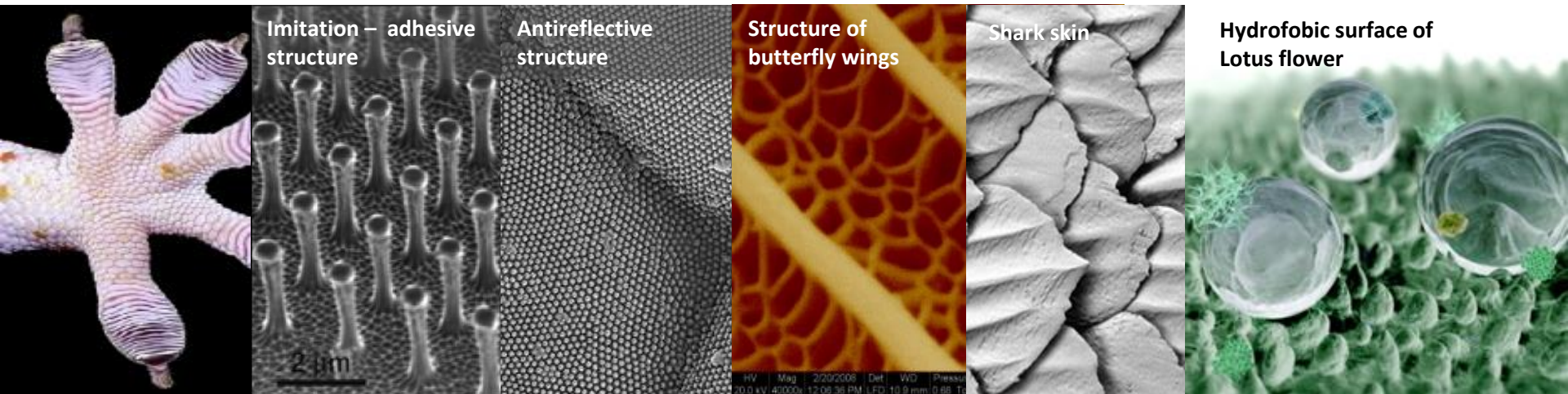


NATURE

Nano and micro structures are often inspired by nature, a master of amazing non-conventional solutions.

The nature has always been creating effective solutions, using the mechanism of evolution to perfectly hit the purpose.

Combining the virtue of the nature with our technologies we are able to extend the functionality of structures developed by the evolution.



**THANK YOU FOR YOUR
ATTENTION**

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