Czech Nano Show 2016

IQ Structures s.r.o.

www.iqstructures.com

Zbynek Ryzi

Company Profile

IQ Structures s.r.o.

start up company founded in **2012** <

mainly financed by **private** capital of shareholders <

2015 - first **profitable** year, revenue about 3 mil. EUR <

Business Model

to add **value** and **functionality** to plastics, metals or ceramics <

by using **micro-** and **nano-structuring** to modify their properties <

in order to meet **customer's specific requirements** <

Location

main office in Technology Park in Řež near Prague <

nano-center in Brno <

Company Profile (cont.)

IQ STRUCTURES

Cooperation Partners

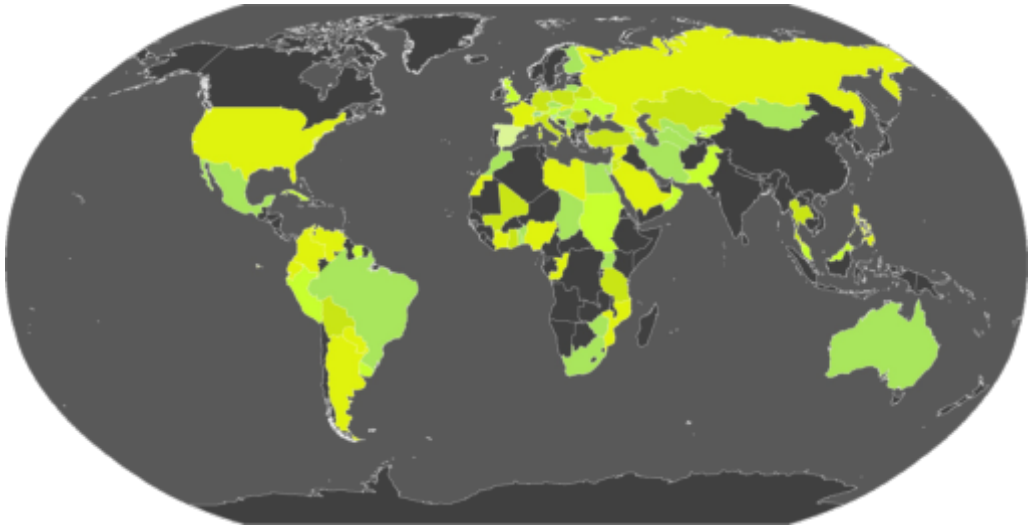
research and development cooperation with the Czech Academy of Science <

product development cooperation with partners in Europe and USA <

Staff

management and team of scientists and engineers with more than 20 years' experience <

in development, production and delivering products to more than 80 countries worldwide



Our Mission

IQ STRUCTURES

Development — **Production** — **Application**

of micro- and nano-structures in various industries

changing the properties of materials or products

giving them completely new and unique features

adding functionality

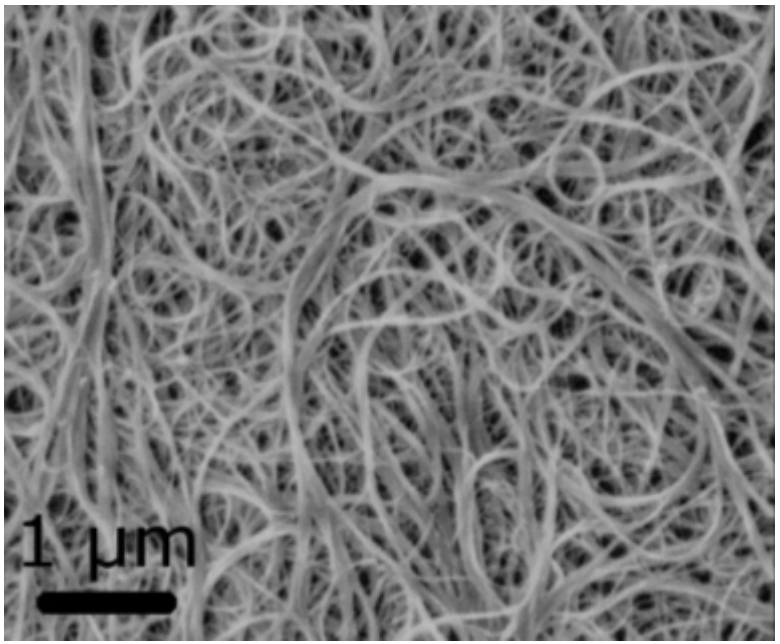
Creative Approach — **Interdisciplinary Expertise** — **State-of-the Art Technology**

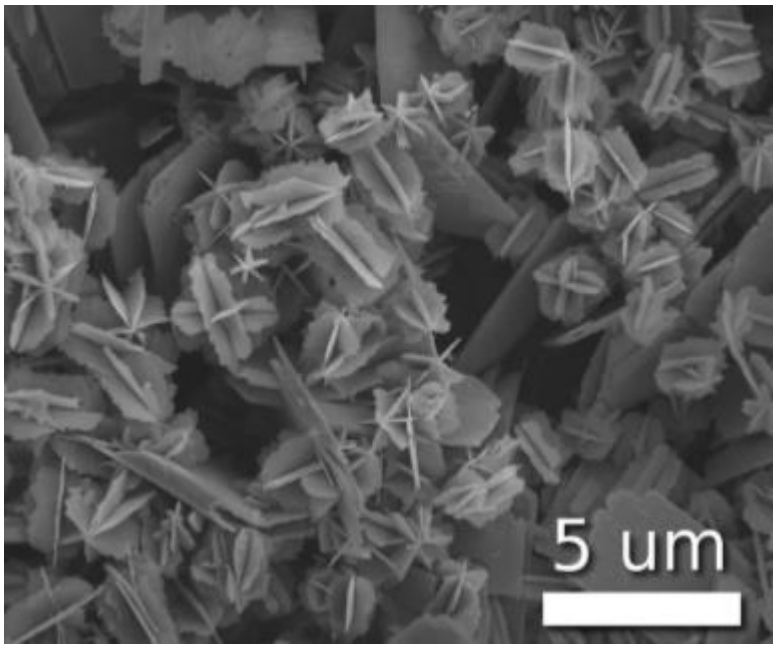
More Than Random Structures

IQ STRUCTURES

In the field of nanotechnology we focus on the development of structures **precisely defined** in all three dimensions.

Our expertise is **not** in the production of random or self-organized structures like nanotubes or nanoparticles.





Controlled Architecture

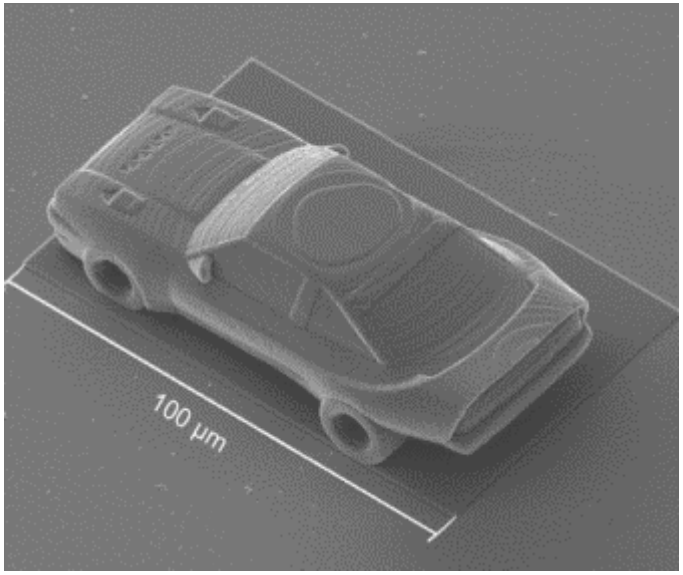
IQ STRUCTURES

Building on our past experience with 2D structures, we seek to control also the **third dimension** of micro- and nano-structures.

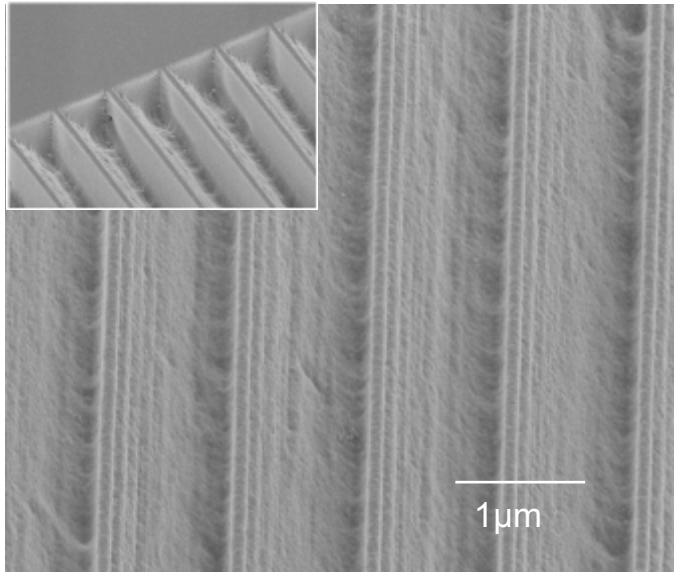
Typical feature sizes of micro- and nano-structures**:**

10s of micrometers down to 10s of nanometers

Volume Structures



Surface Structures



Production Process

IQ STRUCTURES

IQ Structures Design
Customer's Design

Design

Primary Structure
> proof-of-concept
> prototype
> final master mold

Master Production

Individual Copies
Step-and-repeat
Roll-to-roll

Industrial Replication

Mastering Techniques

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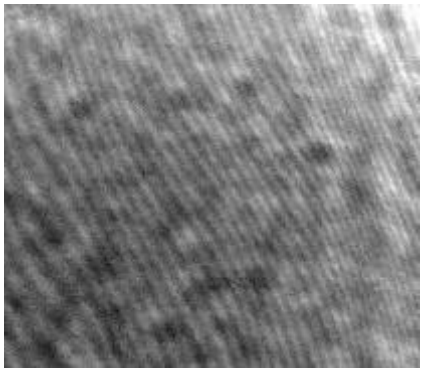
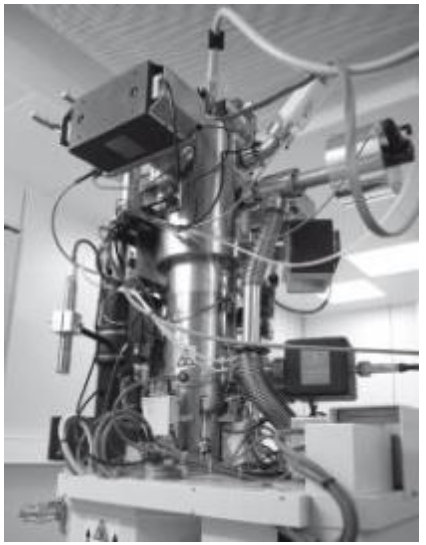
Master Production

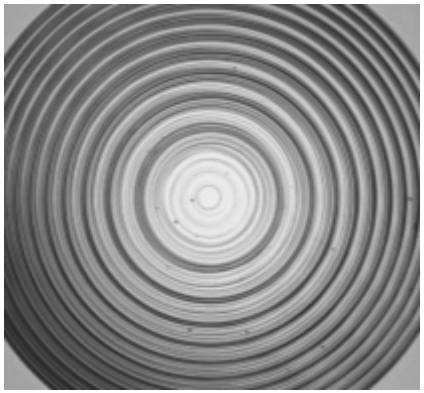
- interference lithography



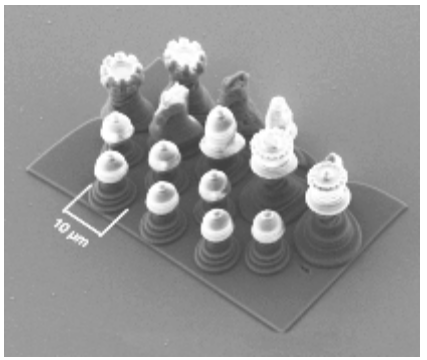
- UV lithography
- direct e-beam writing



- laser lithography

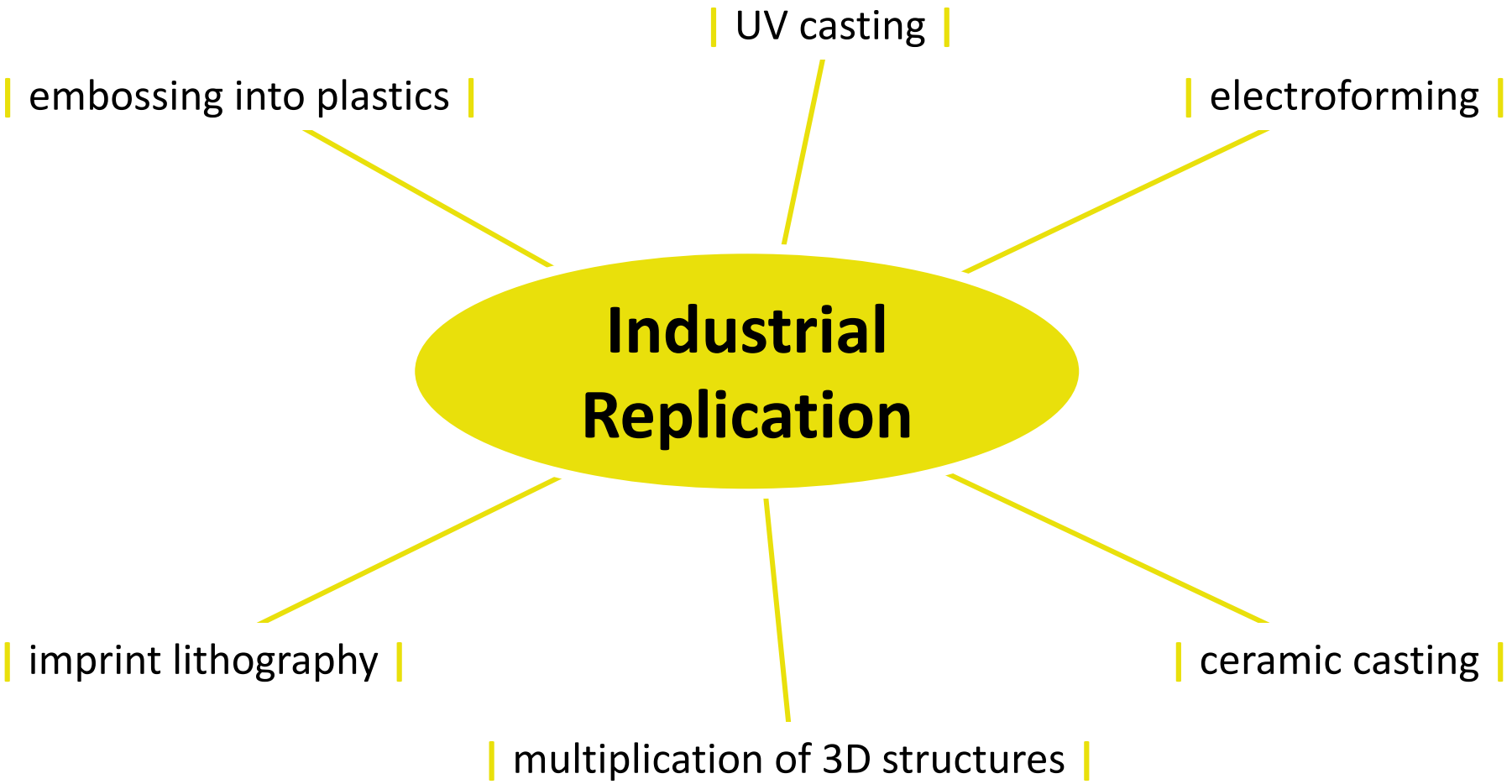


- 3D nano-printing



- ion etching
- mechanical engraving
- nano-imprint lithography

Replication Techniques



Security Products

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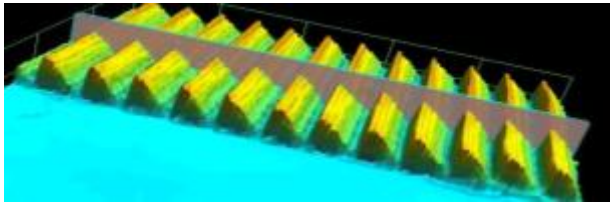
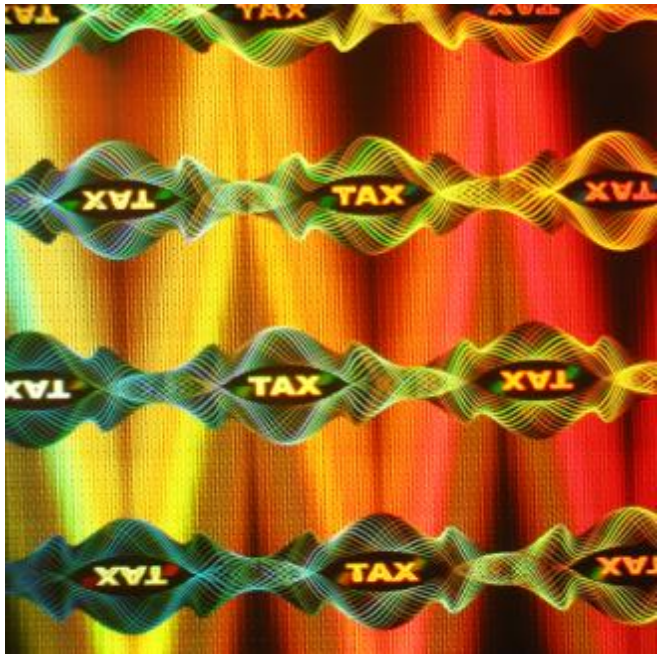
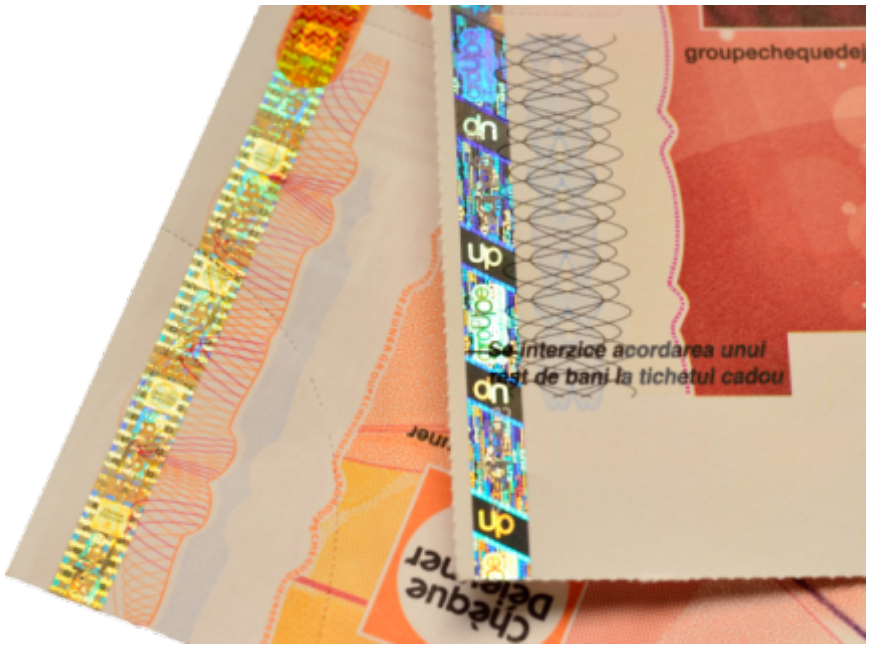
Primary element – **OVID** (optically variable image device)



> holographic/diffractive image structure
> covert images – diffractive or micrographical
> hidden micro- and nano-features
> micro- and nano-structures formed in various layers (metallic, HRI)





Security Products – IQ Label

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IQ Label – complex combination of OVID structure with other security features

OVID micro- and nano-structure

Inks and Pigments

> optically variable inks

> UV, IR, thermoactive inks

Tamper-evident Features

> perforation layers

> separation layers

Additives

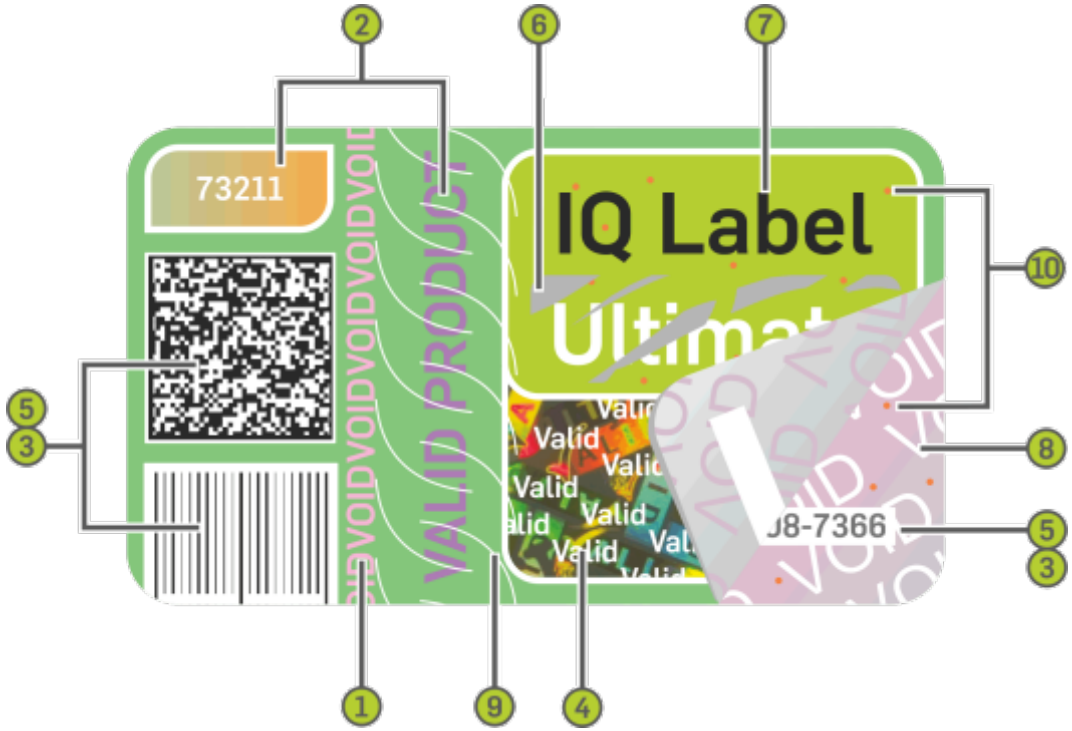
> IQ tag

> IQ dot

Tracking Features

> bar code / QR code

> numbering / personalization



1. special pigments (thermoactive, IR, ...)
2. common pigments (UV, OVI, ...)
3. track & trace system (barcode, QR code, ...)
4. hologram (Cu Al, HRI) with demetallization
5. personalization (barcode, QR code, laser engraving)
6. scratch-off
7. print
8. void-effect
9. perforation layers
10. IQ dots

Security Products – IQ pro*ID*

IQ pro*ID* designed for protection of polycarbonate based documents

> primarily for **government** issued documents (passports, ID cards, driving licenses etc.)

> **full size** coverage

> **independent** combination of transparent and metallic layers

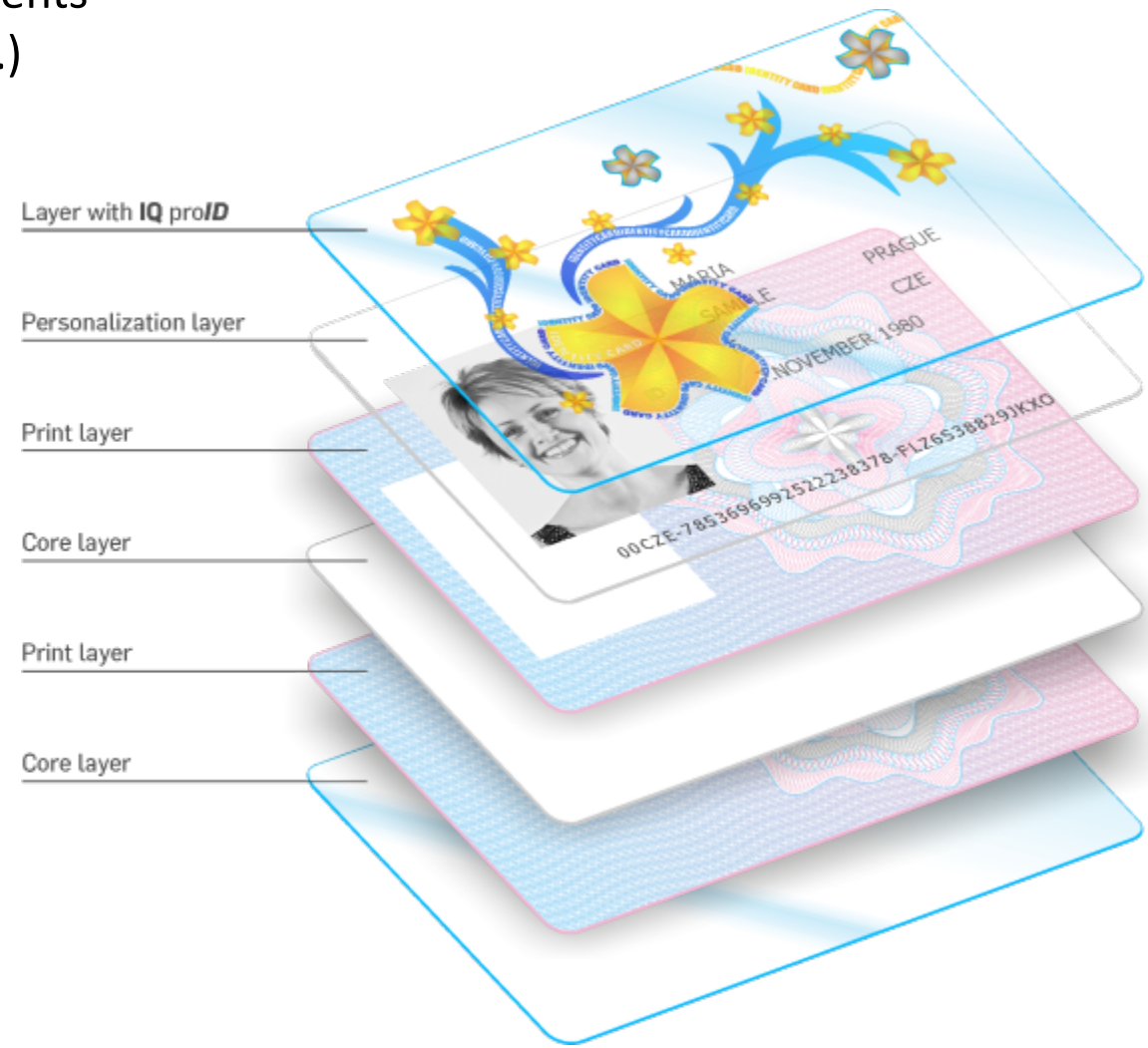
> layers can be **personalized**

> OVID graphics **registered** with printed graphics

> **proprietary lamination** process to ensure inseparability from other layers (patent pending)

> supplied in **sheets** or **rolls**

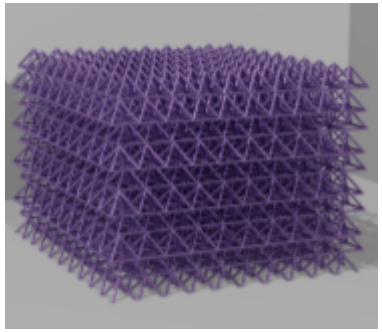
> **certified** by several partners/customers in US and Europe

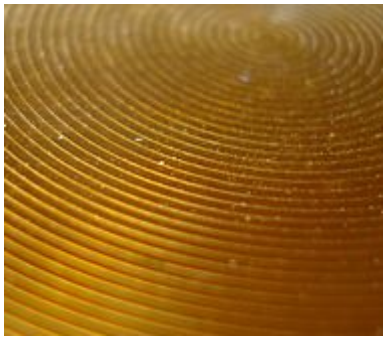


Technical Products

IQ STRUCTURES

- Antireflective, hydrophobic, adhesive structures
- Nano-structured materials – metamaterials
- Tissue and organ replacement
- Micromechanics
- Sensors
- Printed electronic
- Flat optics





Technical Products – flat optics

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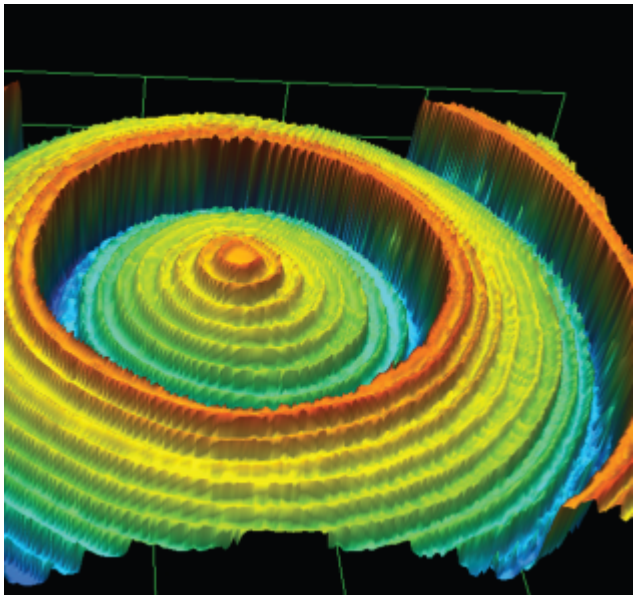
Volume Optics

millimeters

Flat Optics



micrometer

Technical Products – flat optics for LEDs

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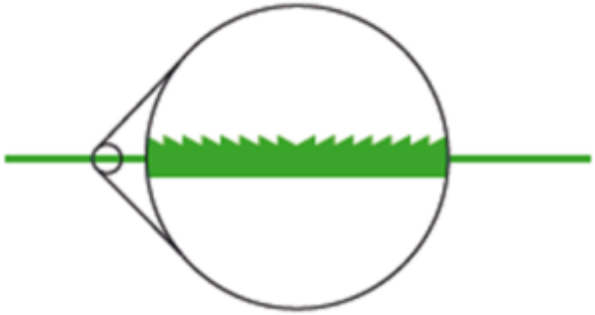
IQ Structures' major development program: flat optics for LED based lights

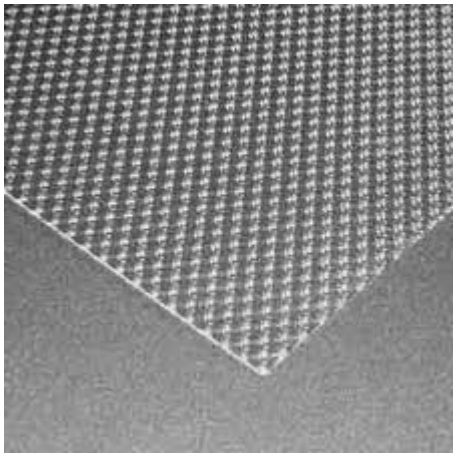
100s microns

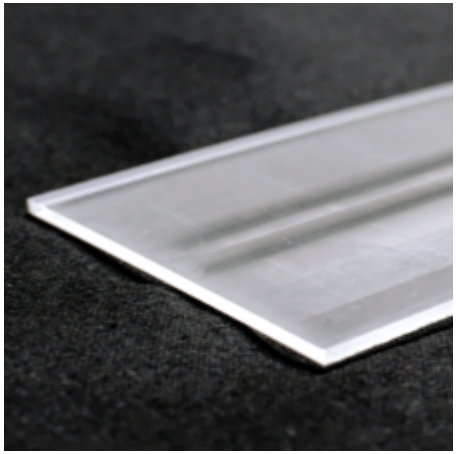
Volume Structures



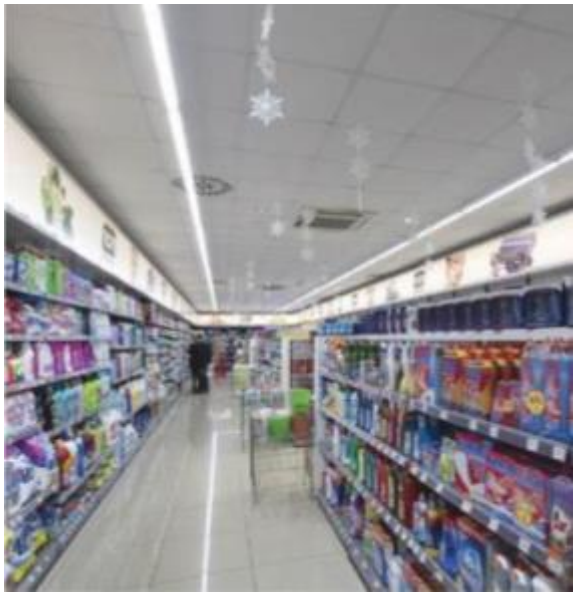
~1 microns

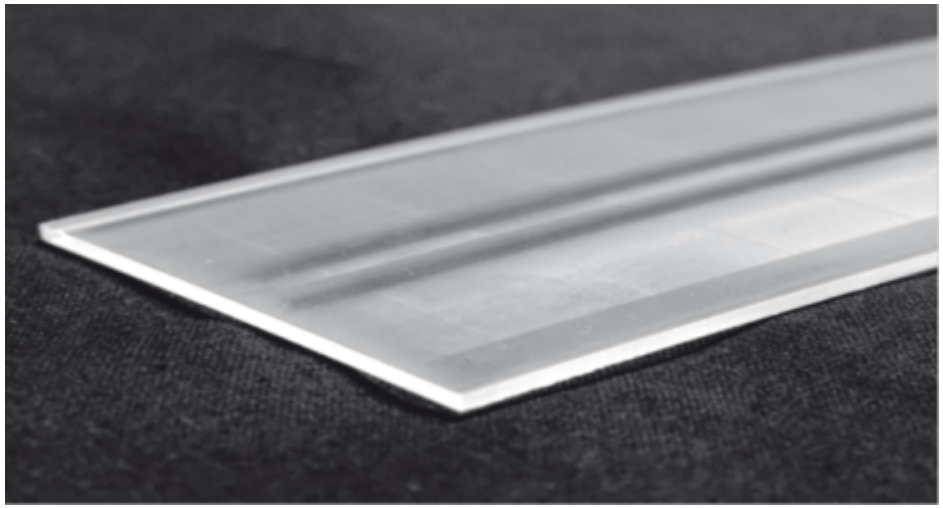
Micro- and nano-structures



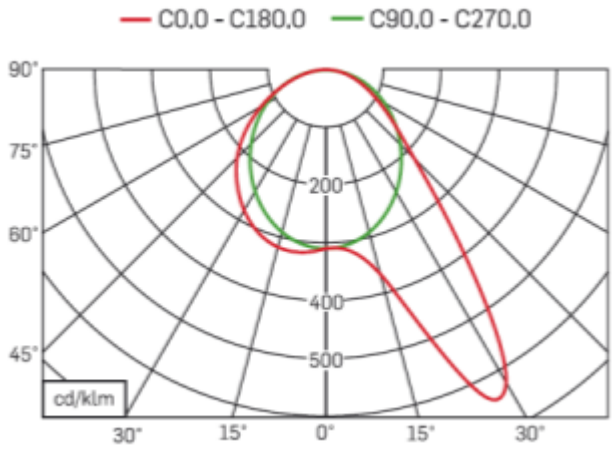


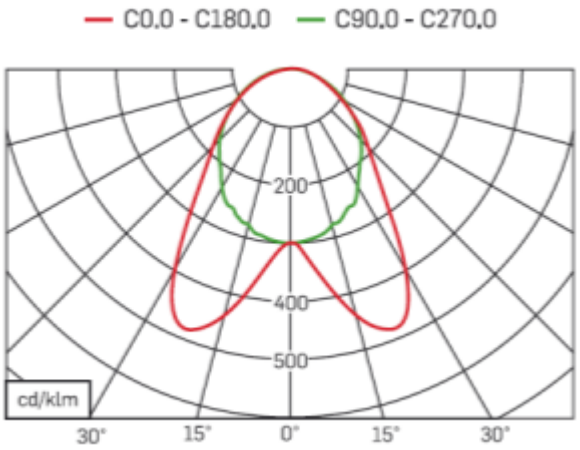
IQ nanoOptics

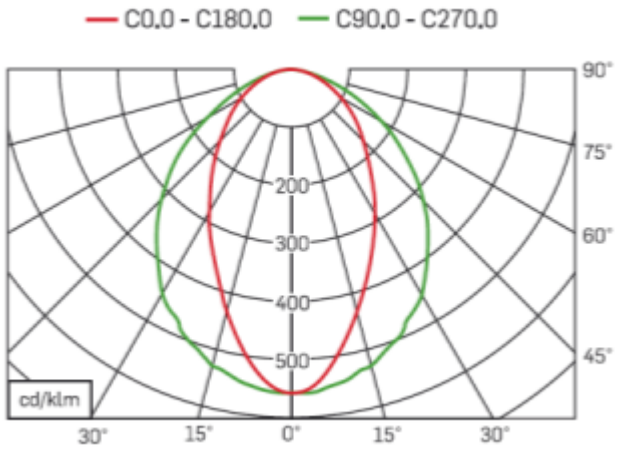




IQ nanoOptics

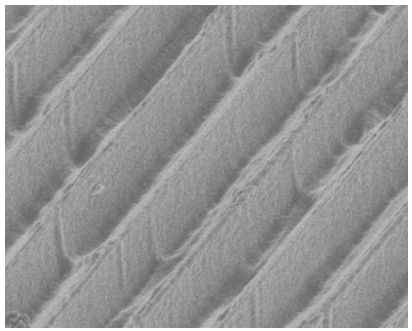


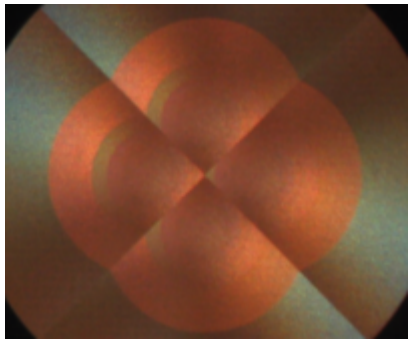


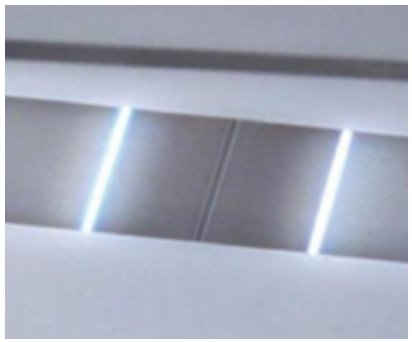


Each **IQ nanoOptics** is custom-designed to meet customer's specific needs

- Each design of **IQ nanoOptics**' structure is **unique**
- Design stage of each job includes **simulations** to verify optical performance
- **Fine-tuning** of the structure's features takes into consideration recording technology constraints
- Master structure is typically produced by **e-beam lithography**
- Master structure is replicated on **films** and/or **sheets**







Key Benefits

- versatility in the design of the optical function
- reduction in weight
- highly transparent
- can be produced efficiently in large volumes

IQ STRUCTURES

Thank you for your attention.

www.iqstructures.com

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