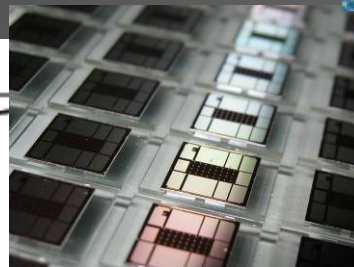
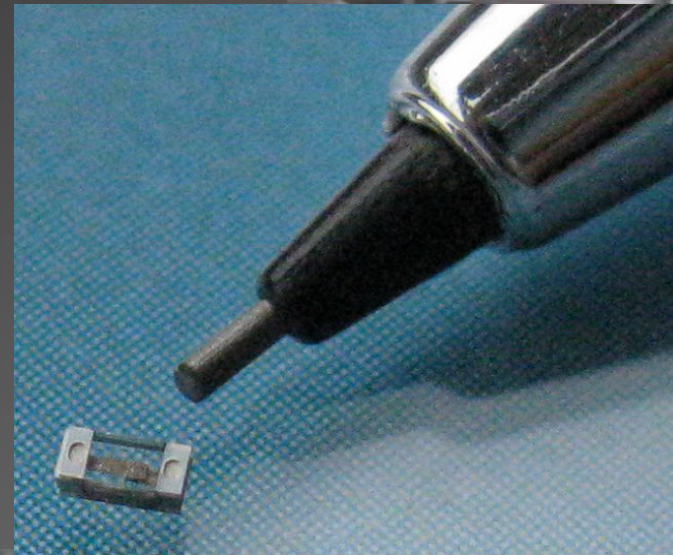
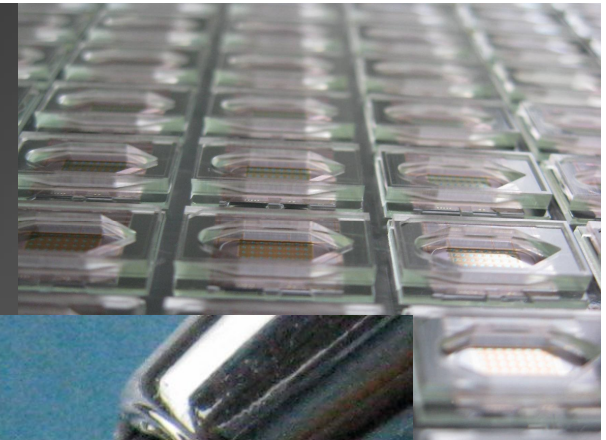


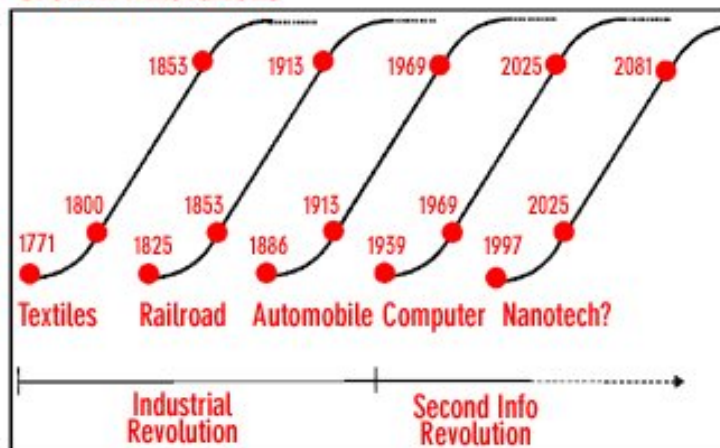
Using new international patented production technologies for polymer mems and high-integrated systems

Micromechanics, MEMS, Plastic Lab-on-a-chip
Production Service, Packaging and R&D
Advanced Micro- and Nanotechnologies
International Patented Technologies:
RMPD® Rapid Micro Product Development
3D-CSP 3-dimensional Chip Size Packaging
From the Idea to the Series Production

World Market of MEMS based electronics:
7 Mrd. today, growth >20% per year



Growth Innovations

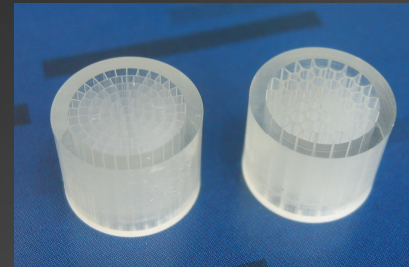


Sources: Norman Poire, Merrill Lynch

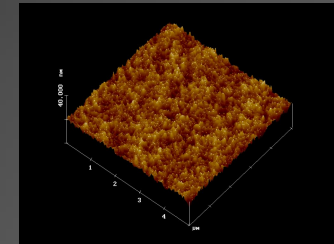


RMPD® - Technologies

multimat



mask

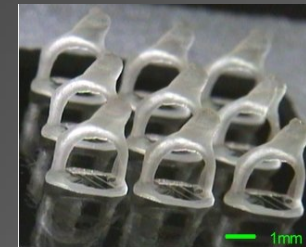


nanoface

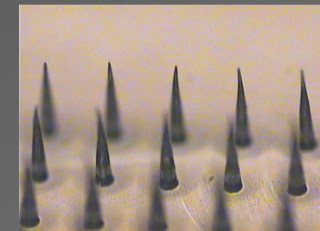
Assembly



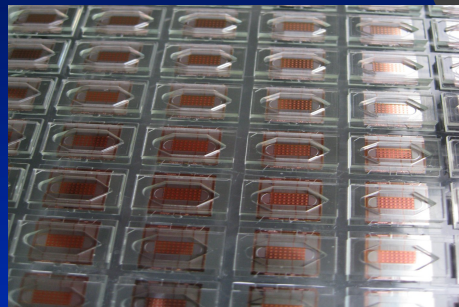
3D-CSP



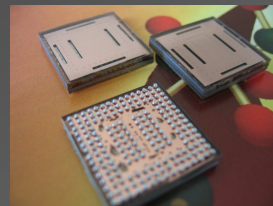
parallel



stick2



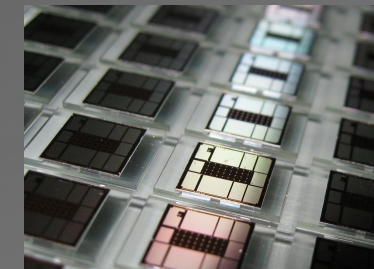
Parallel batch production



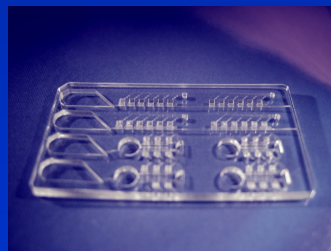
without technology change



300 materials



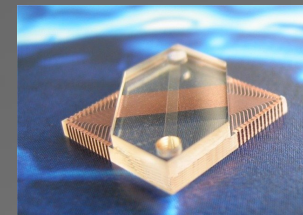
no tools



microFLUIDIC



with light



coating



microTEC business today

Contract Manufacturing and Contract R&D (licenses and training available for special fields)

- **Micromechanics, MEMS Packaging Services and R&D Services**
Highly integrated products speed up the need of 3D-packaging technologies.
This will become a fast growing market for patented 3D-CSP processes.
- **Customized polymer parts like Lab on a chip, customized series production of polymerchips and components used in industry benefit from international patented RMPD ®-technologies**

RMPD® Systems are easy to use and easy to maintain

=>Fast deliverable series parts in flexible units in high precision at low cost

3D-CSP batch process is fast and cost efficient by parallel connecting pads

Easy to handle materials (fluid monomers/polymers)

=>no high-risk chemicals

Every 3D-CAD Software can be used (*.stl/*.iges/*.step a.s.o)

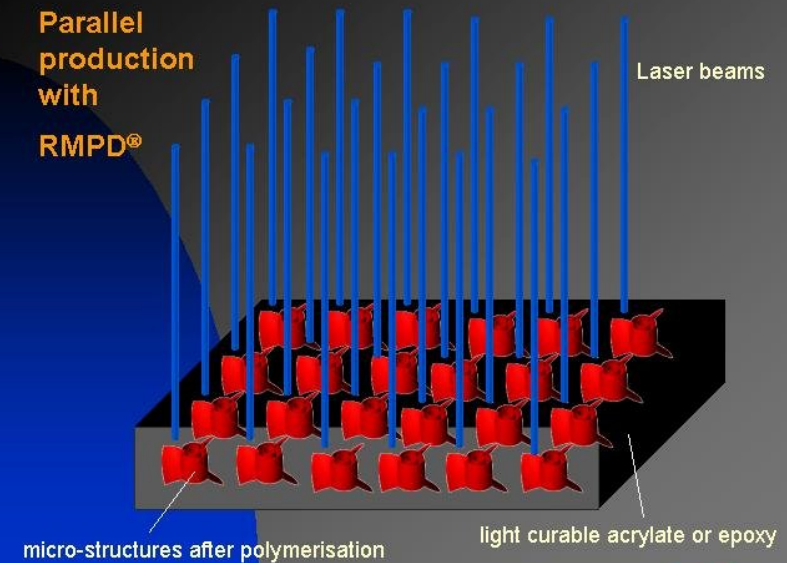
Direct Integration of microelectronic CAD (OrCAD) into Design

Simulation and direct series production of multi material systems!

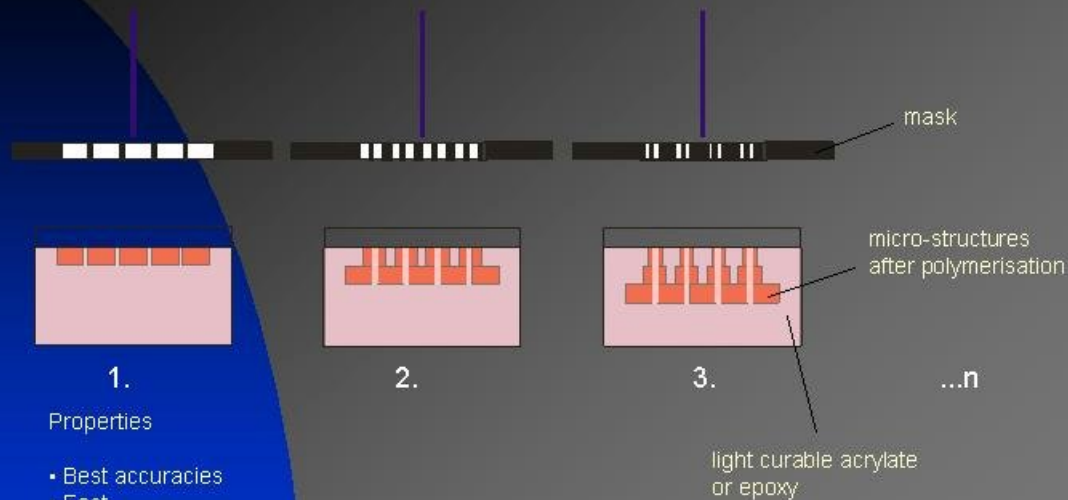


Generative processes for microstructures and -systems

Parallel production with RMPD®



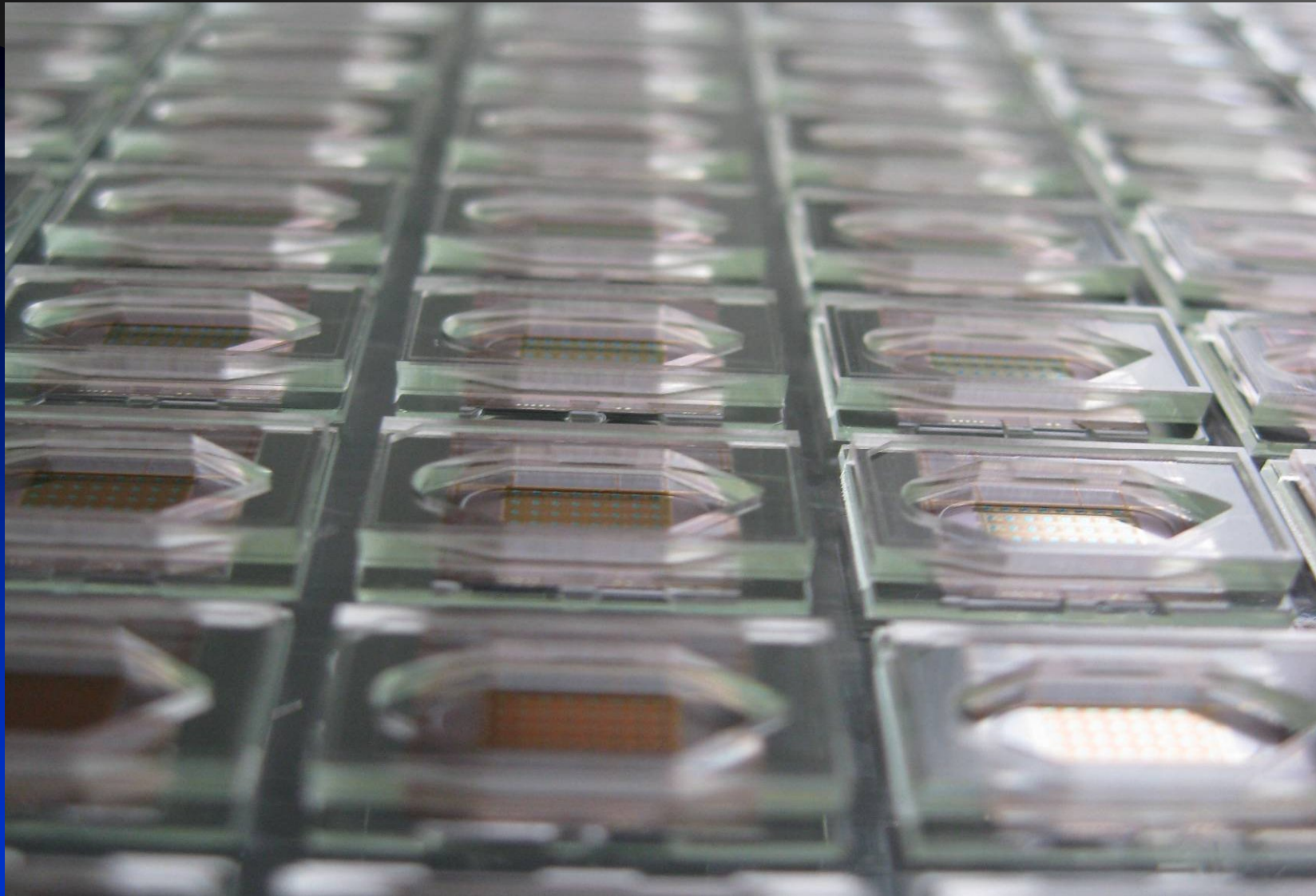
Structures with RMPD®-mask



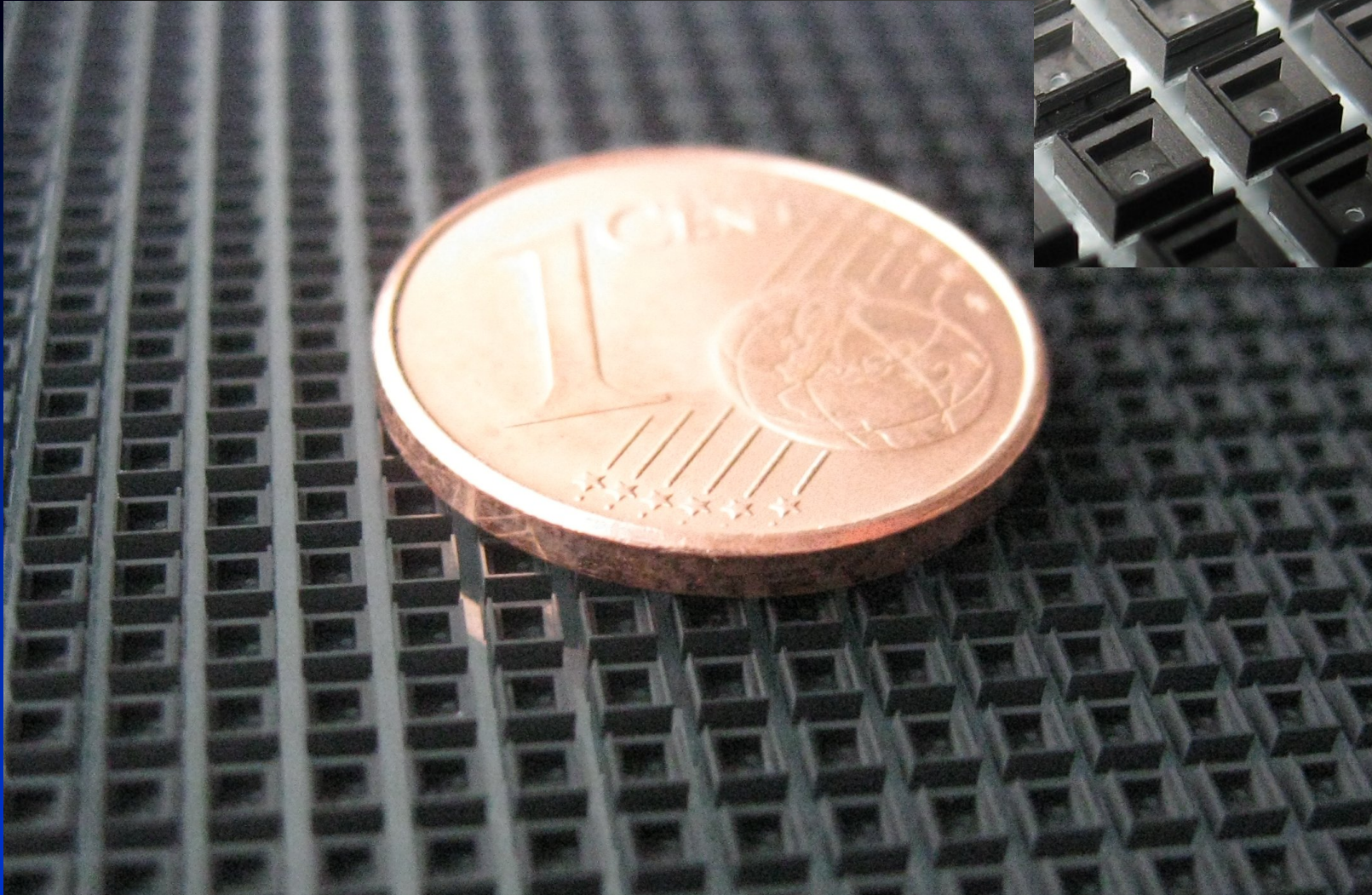
Properties

- Best accuracies
- Fast
- Limitations on geometric design
- Costs and delivery times for masks

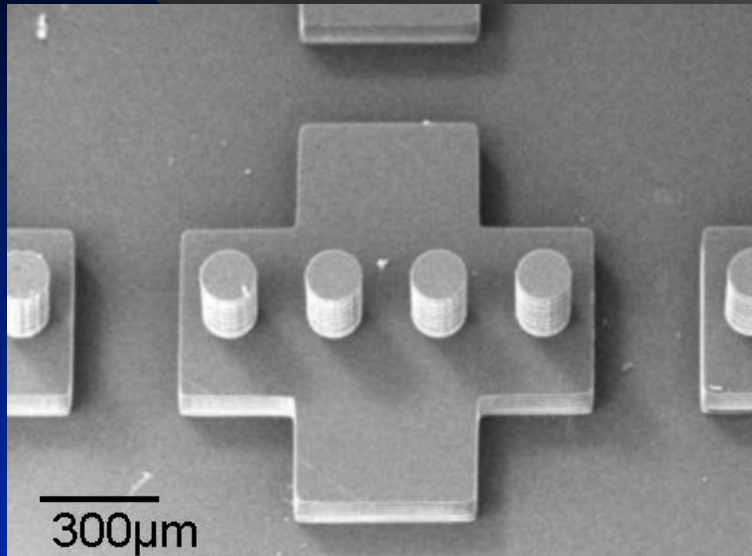
Parallel batch production by RMPD®



RMPD®-mask batch

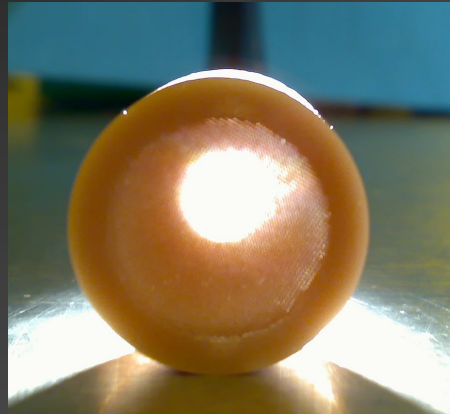
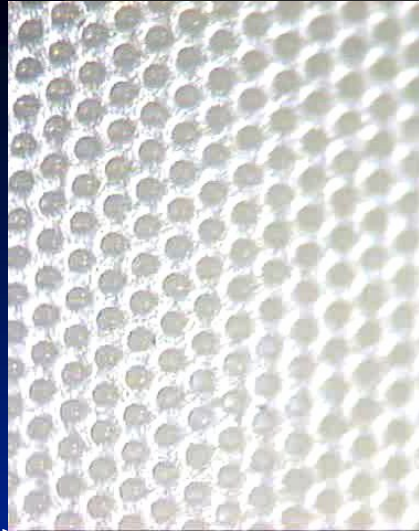


Typical structure for mass production



- series production without tooling
- RMPD®-mask allows production runs up to 1.000.000 parts per machine and hour
- Mass production with 5", 9", 14" and 350 mm mask
- Outlook: 610 mm and RMPD®-Rotation

High aspect ratio

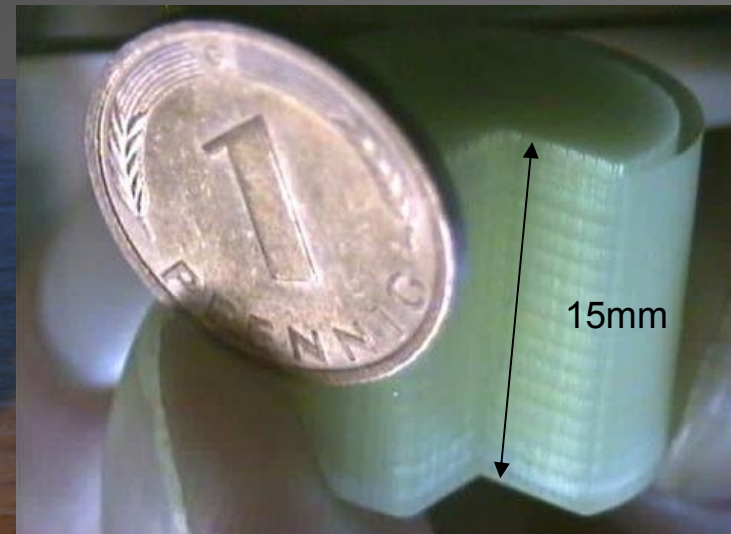
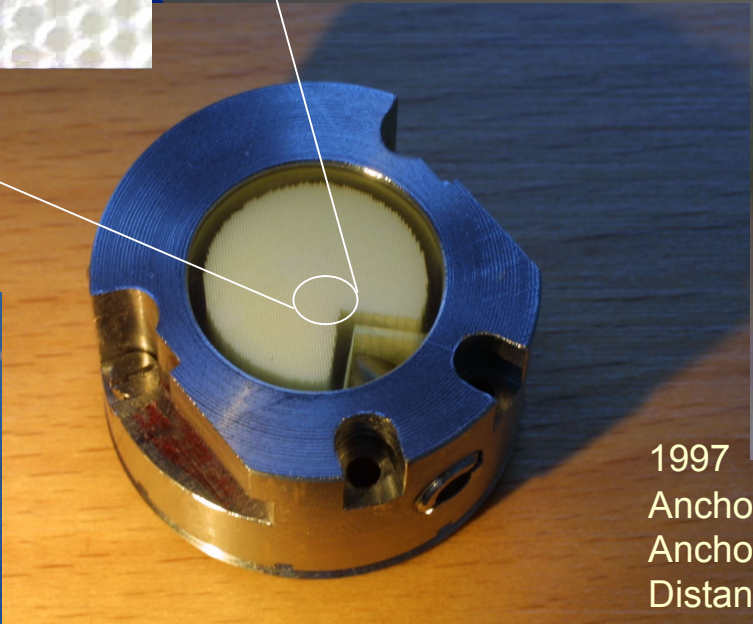
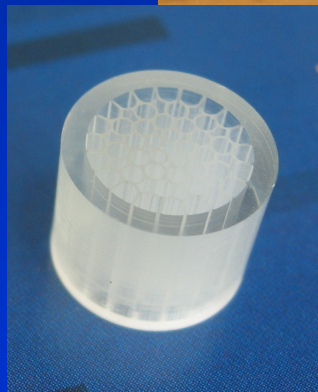


2006

Anchor tube diameter 200 μm

Anchor tube length 20.000 μm

Distance between holes 50 μm



1997

Anchor tube diameter 150 μm

Anchor tube length 15.000 μm

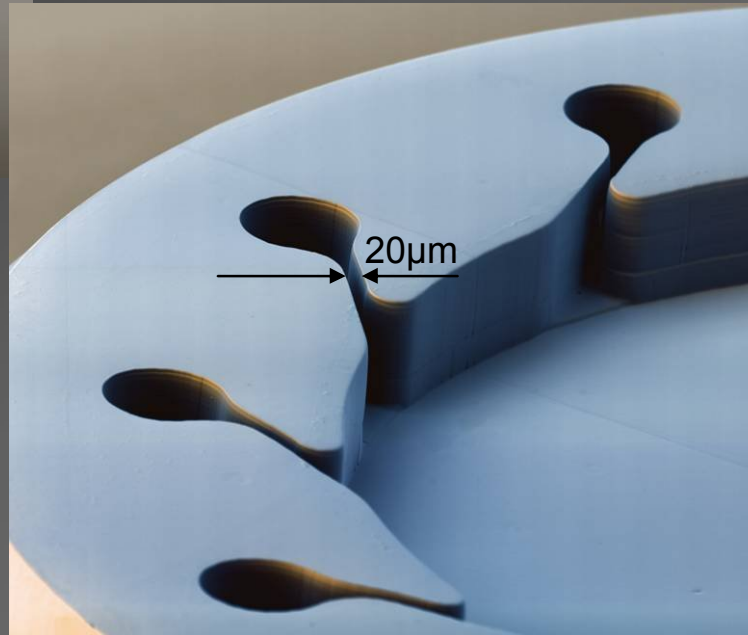
Distance between holes 70 μm

Component for Medical Applications, Micro Heat Engines and other applications

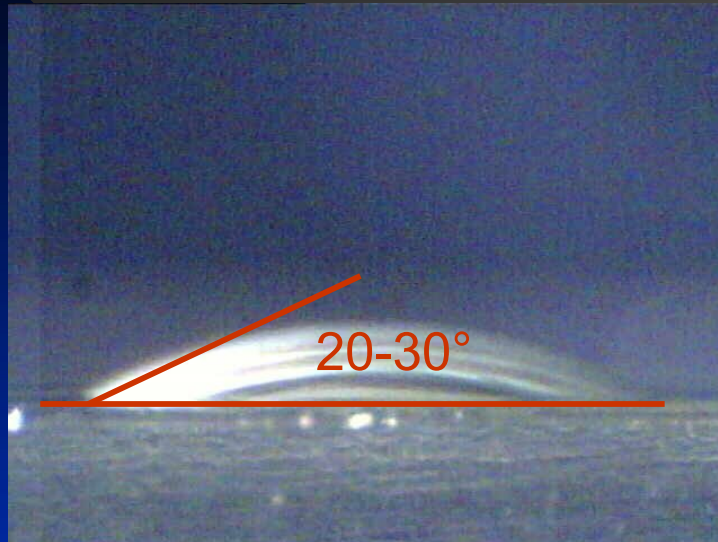


Nozzle plate for driving head

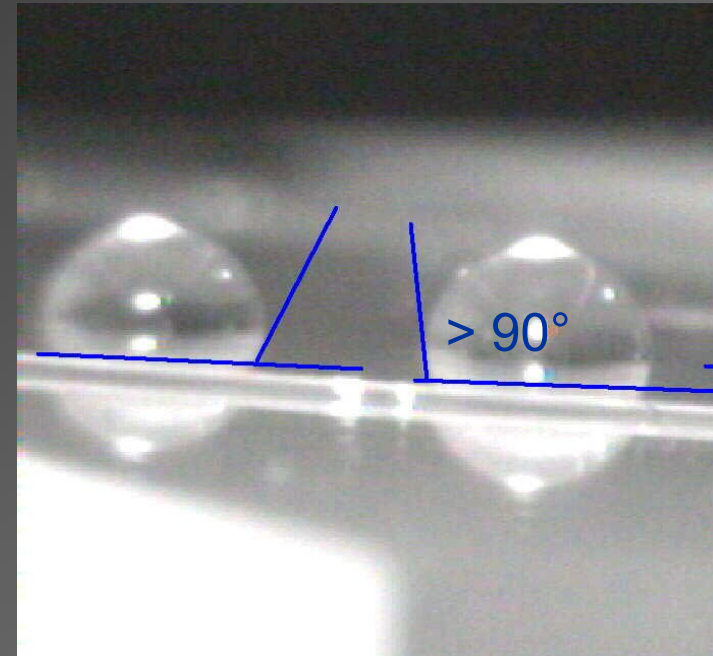
- Diameter = 4 mm
- Nozzle width = 20 μm



Micro-fluidic applications: Intrinsic hydrophilic and hydrophobic material properties require no coating



Hydrophilic materials for:
Capillary flow enhancement



Hydrophobic material for
Dispensing units
Nozzle structures
Surface protection

smart spotting

Fluidic- stop structure, as ventilation duct

Principle:

Gases pass through
Liquids are blocked

Applications:

- Ballpoint pen
- Air vent ampule

Tube diameter

Tube length

Distance between holes

Aspect ratio

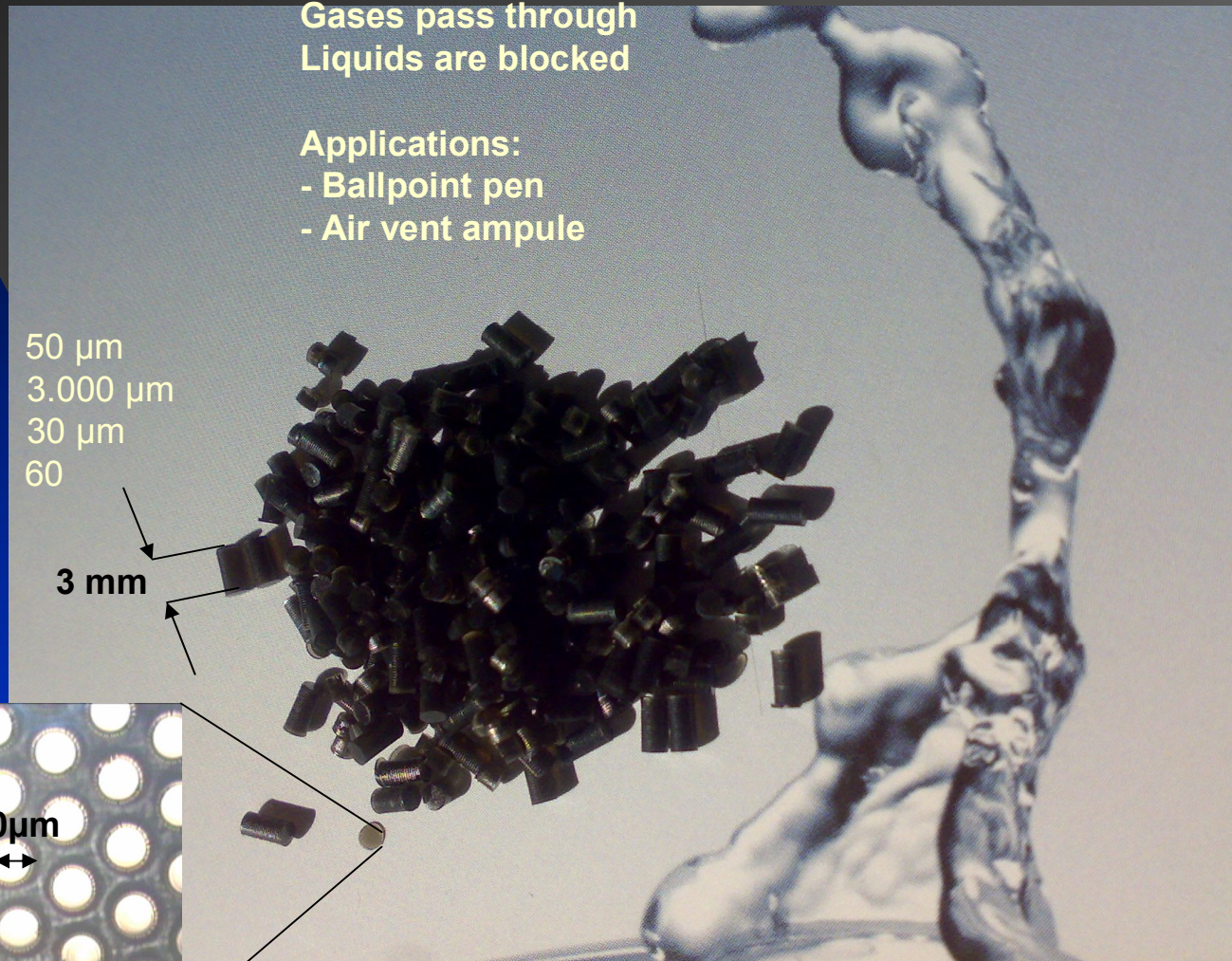
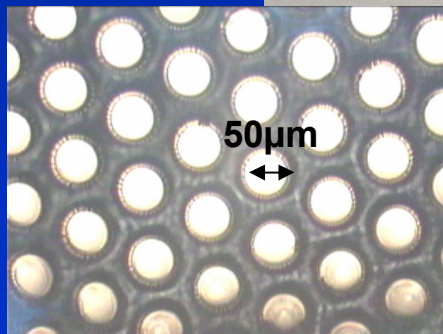
50 μm

3.000 μm

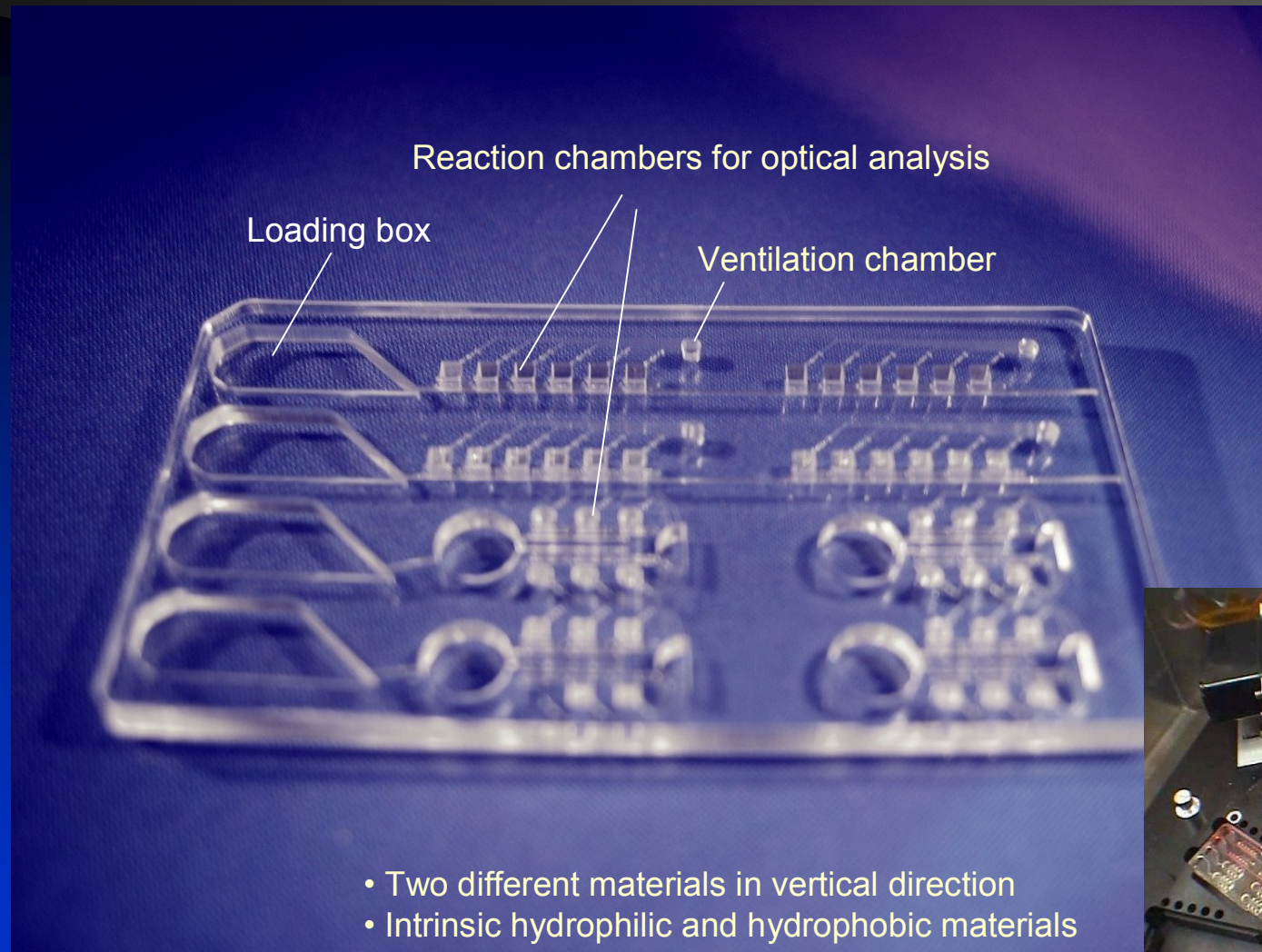
30 μm

60

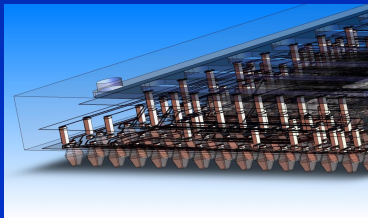
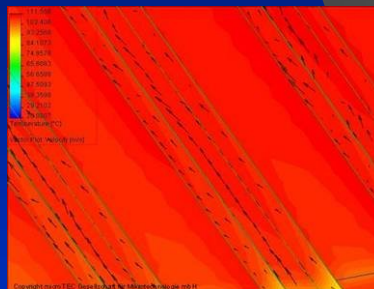
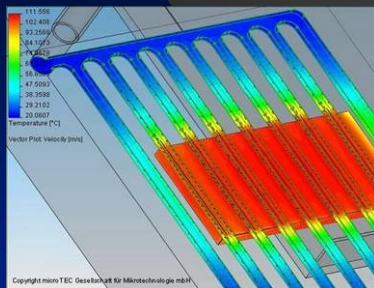
3 mm



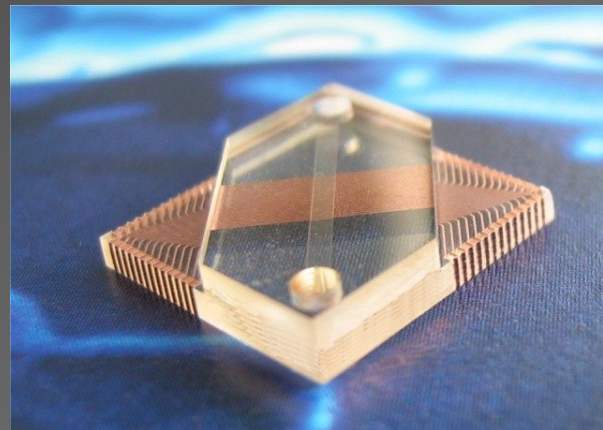
Microfluidic chips, automatically processed for analysis



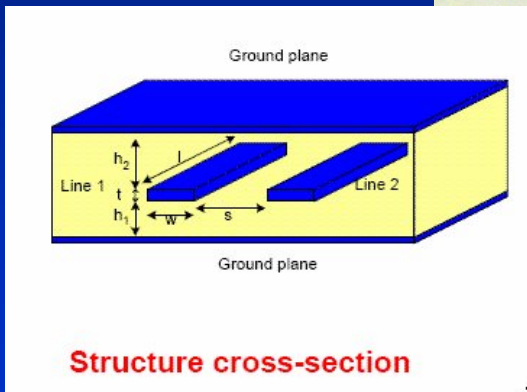
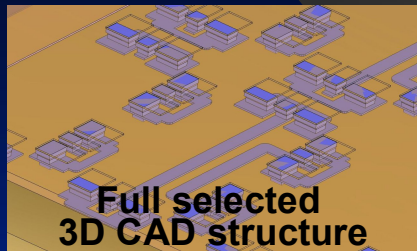
➤ 3D-CSP NMRC Thermal Simulation



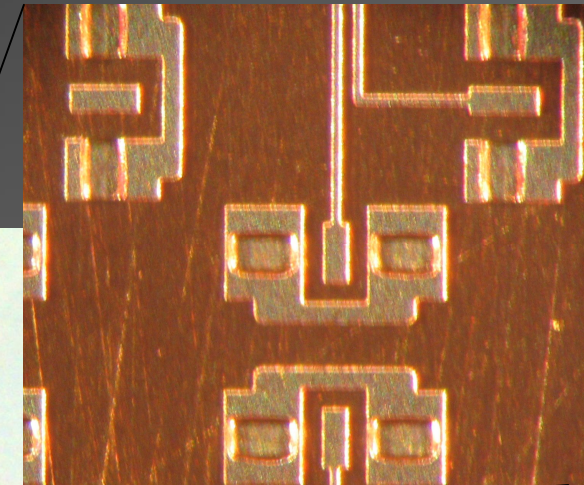
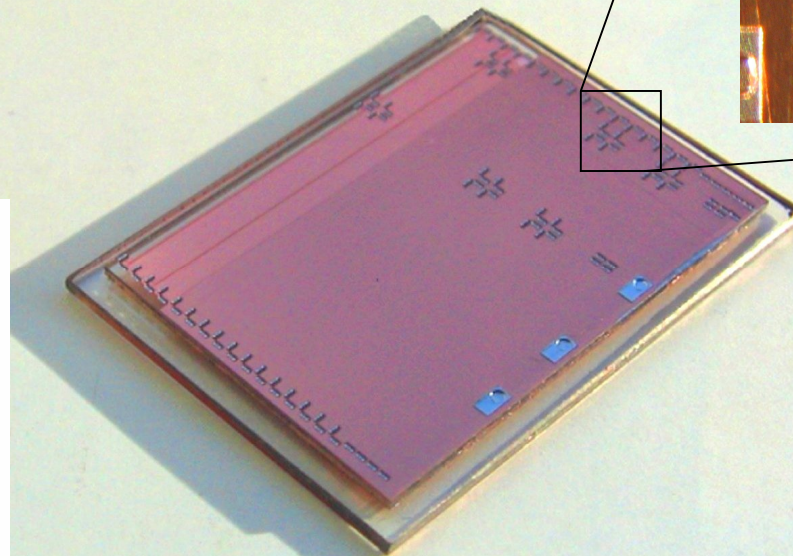
- Passive cooling: Possible
- Option: Active cooling via EHD pump



3D-CSP RF test structures, RF-parameter available for development of baluns and antennas for ZigBee



Frequency range: 100 MHz ... 8,5 GHz

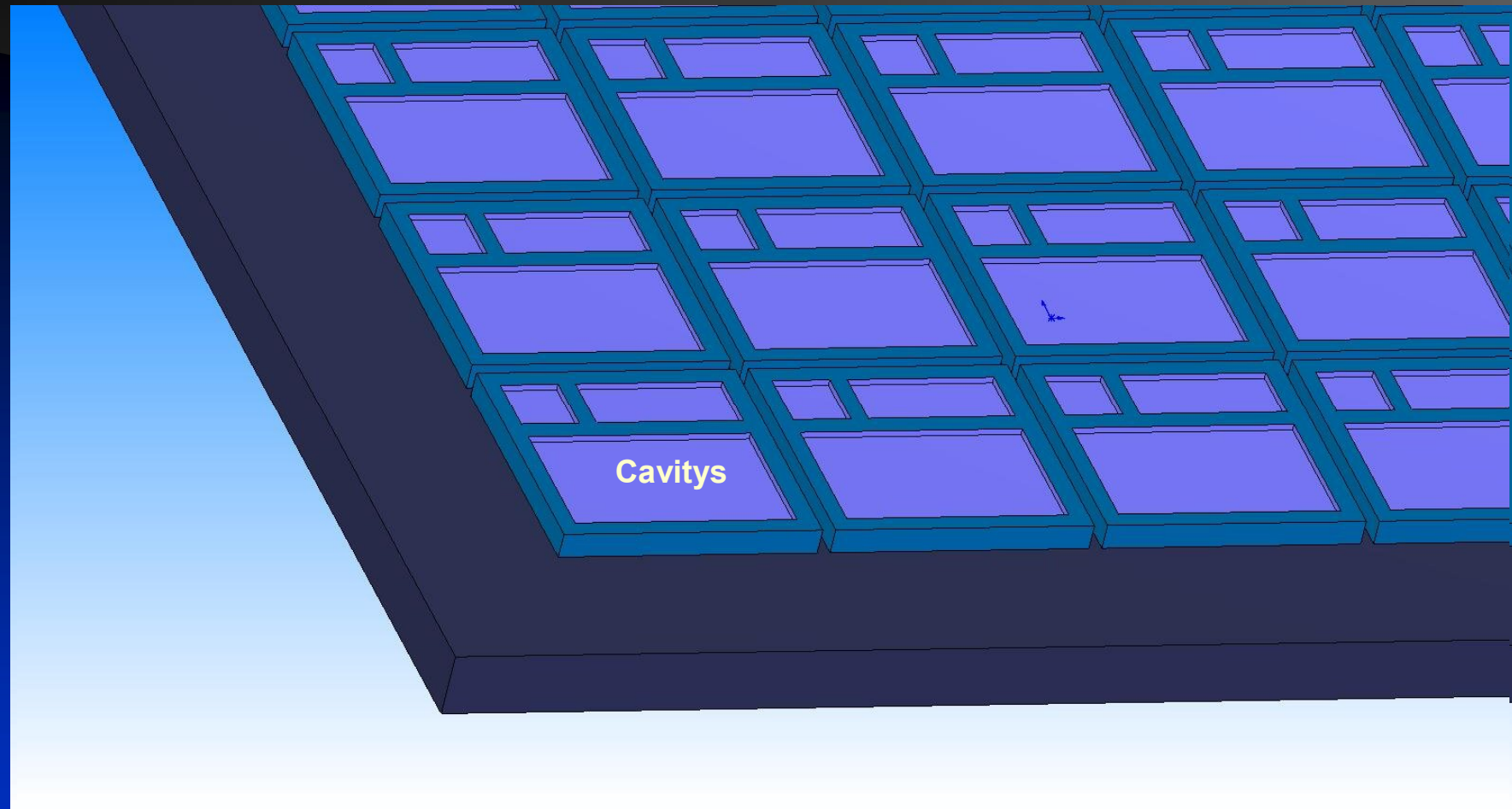


R=	0.118Ω/mm
L=	0.34nH/mm
C=	0.063pF/mm
G=	3 10 ⁻⁸ S/mm
k:	Distance 25um – k=0.083
	Distance 50um – k=0.02
	Distance 75um – k=0.005

4 interconnection - and shielding layers and 6 isolation layers



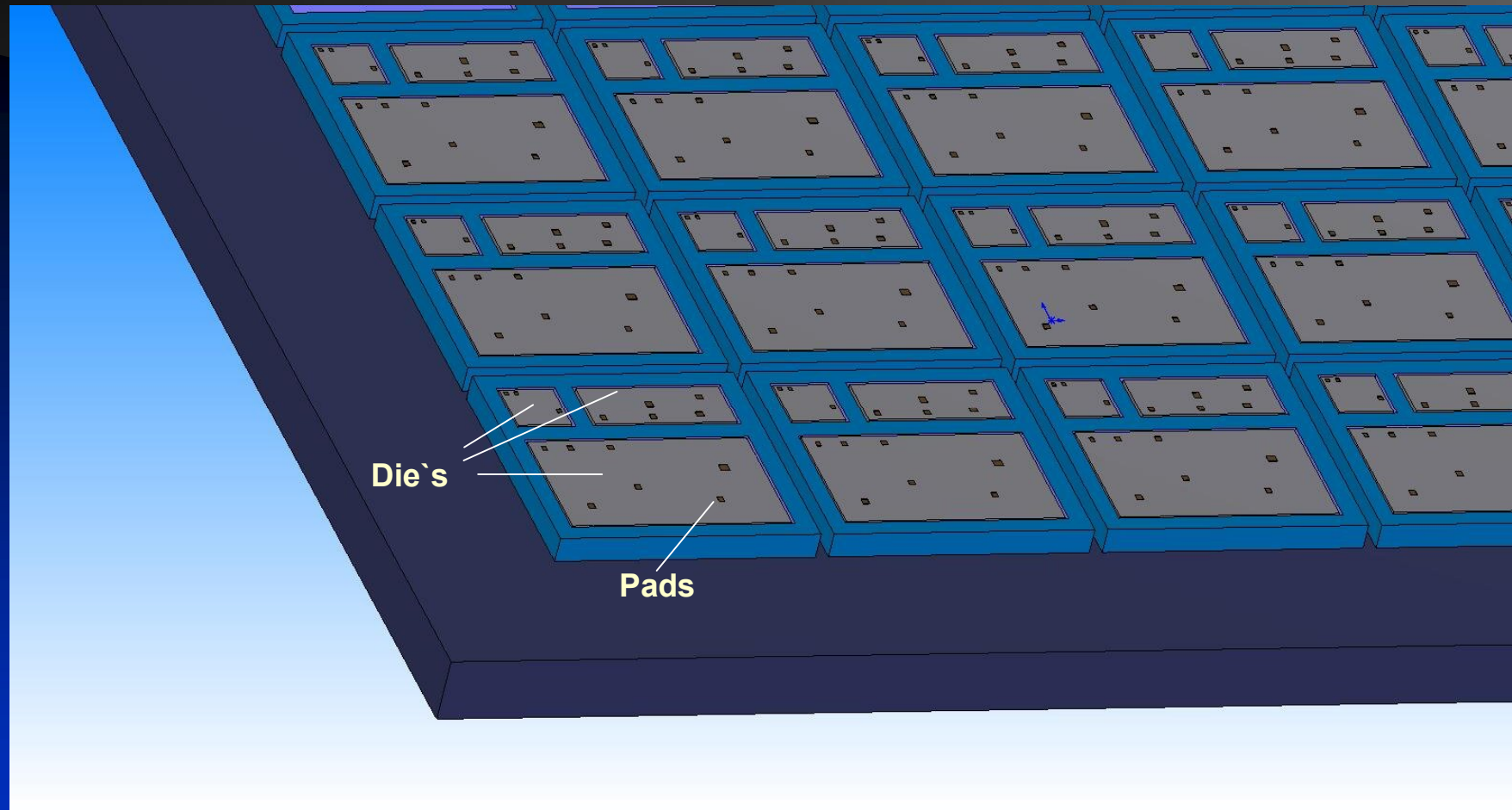
3D-CSP Batch process



4 Step Process to build MEMS

1. **RMPD® -Mask**
2. Placement of inserts
3. Metallisation
4. Metal Layer structuring

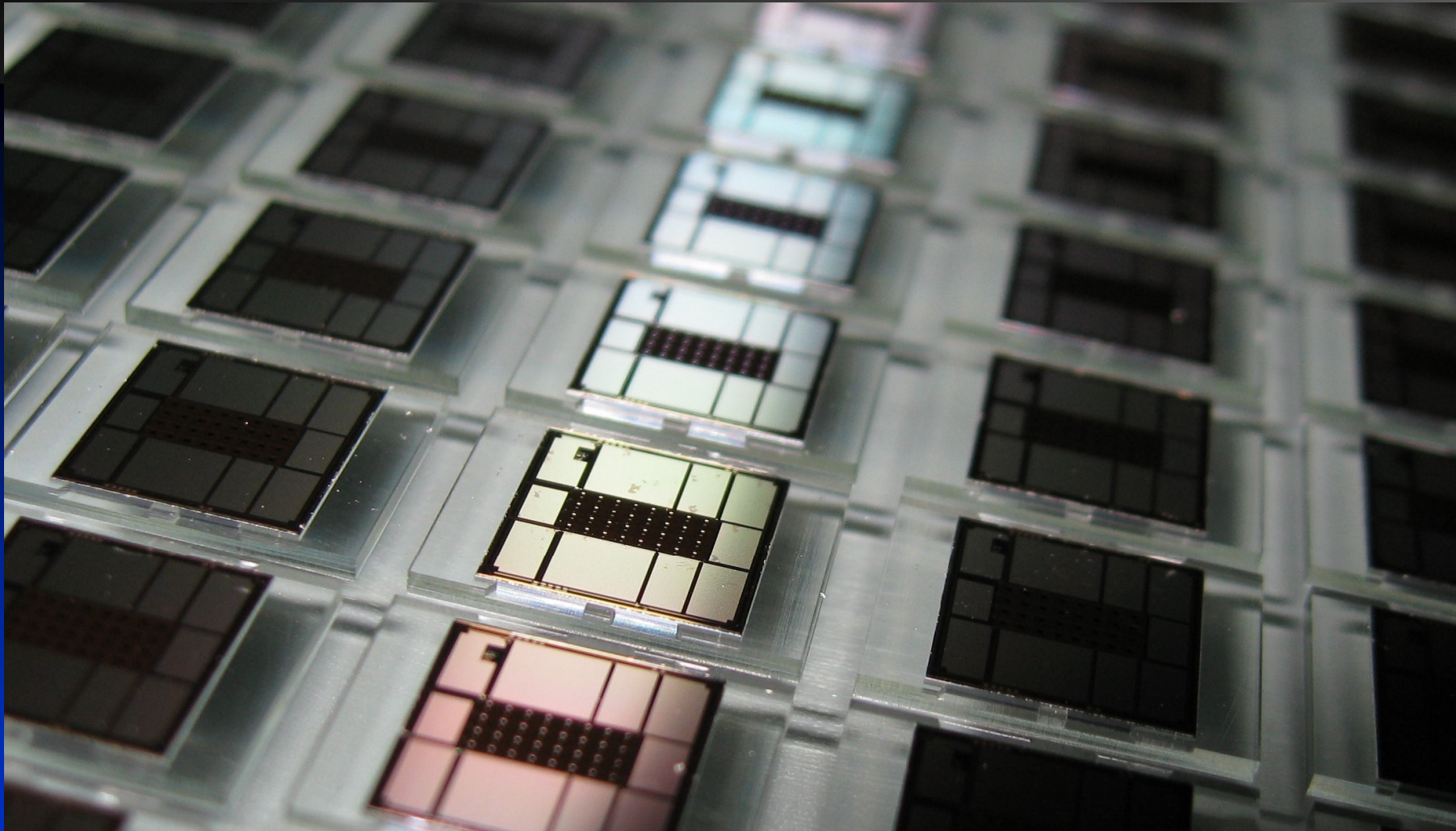
3D-CSP Batch process



4 Step Process to build MEMS

1. RMPD® -Mask
2. **Placement of inserts**
3. Metallisation
4. Metal Layer structuring

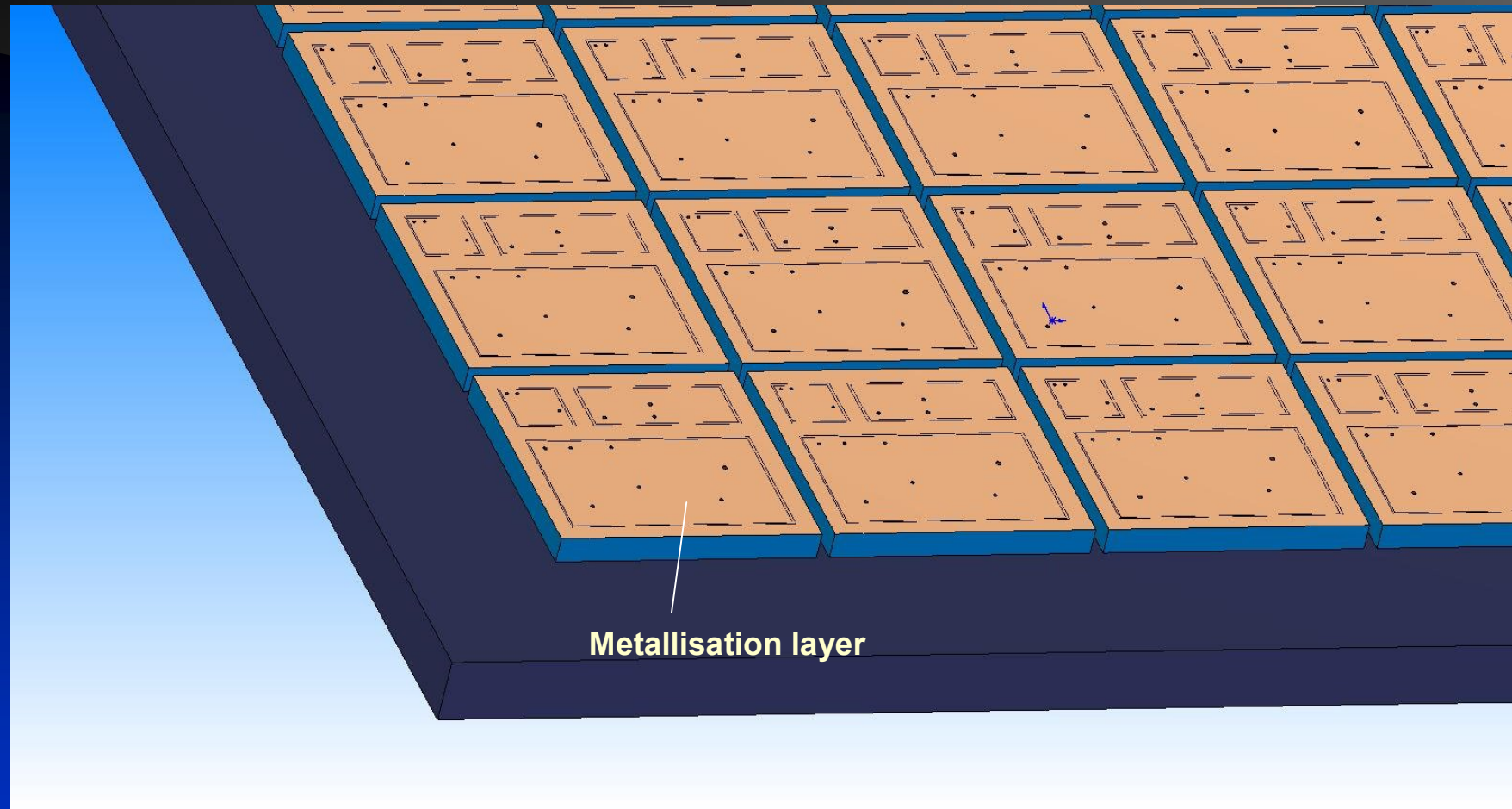
3D-CSP Batch process



4 Step Process to build MEMS

1. RMPD® -Mask
2. **Placement of inserts**
3. Metallisation
4. Metal Layer structuring

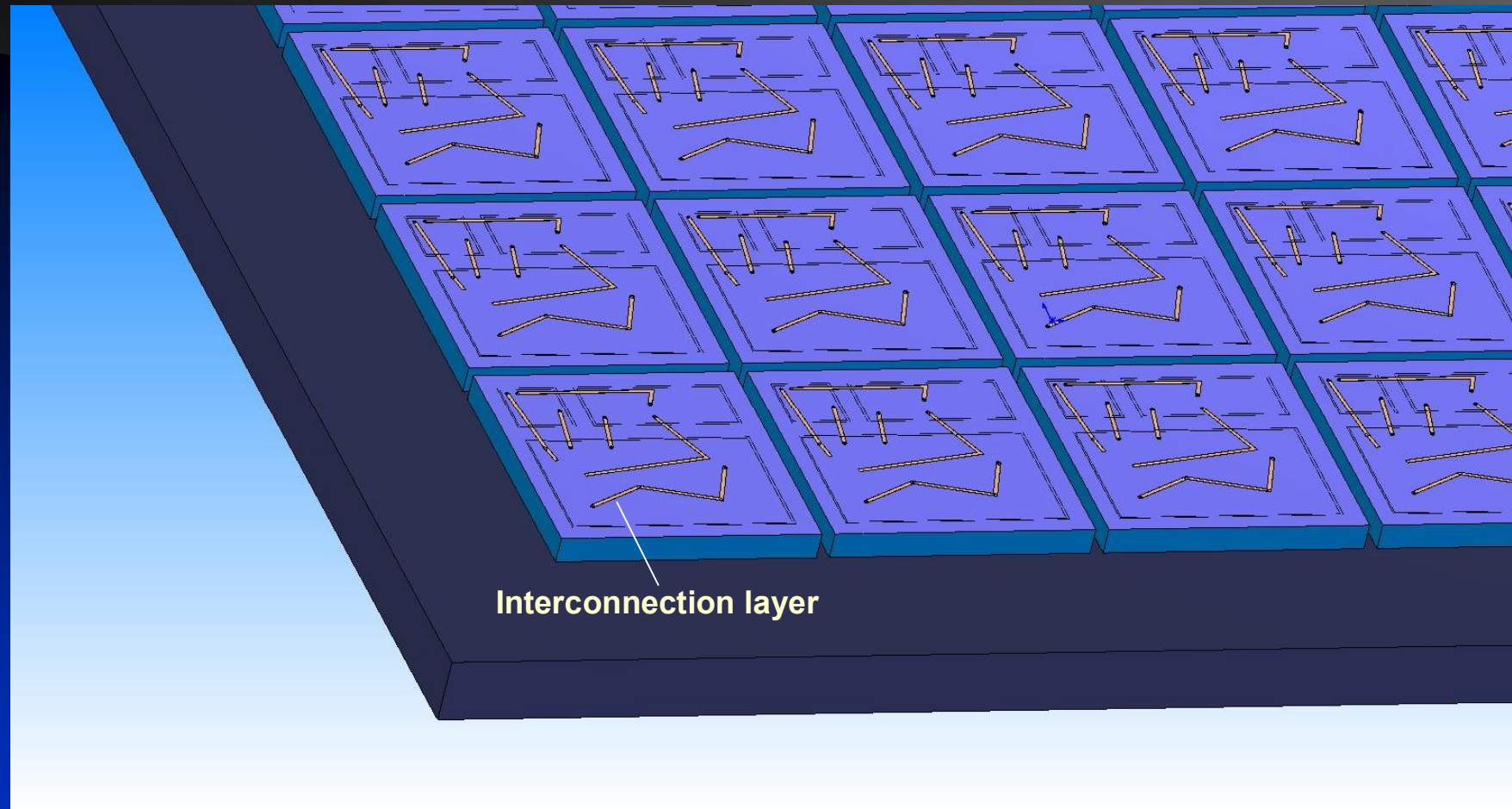
3D-CSP Batch process



4 Step Process to build MEMS

1. RMPD® -Mask
2. Placement of inserts
3. **Metallisation**
4. Metal Layer structuring

3D-CSP Batch process

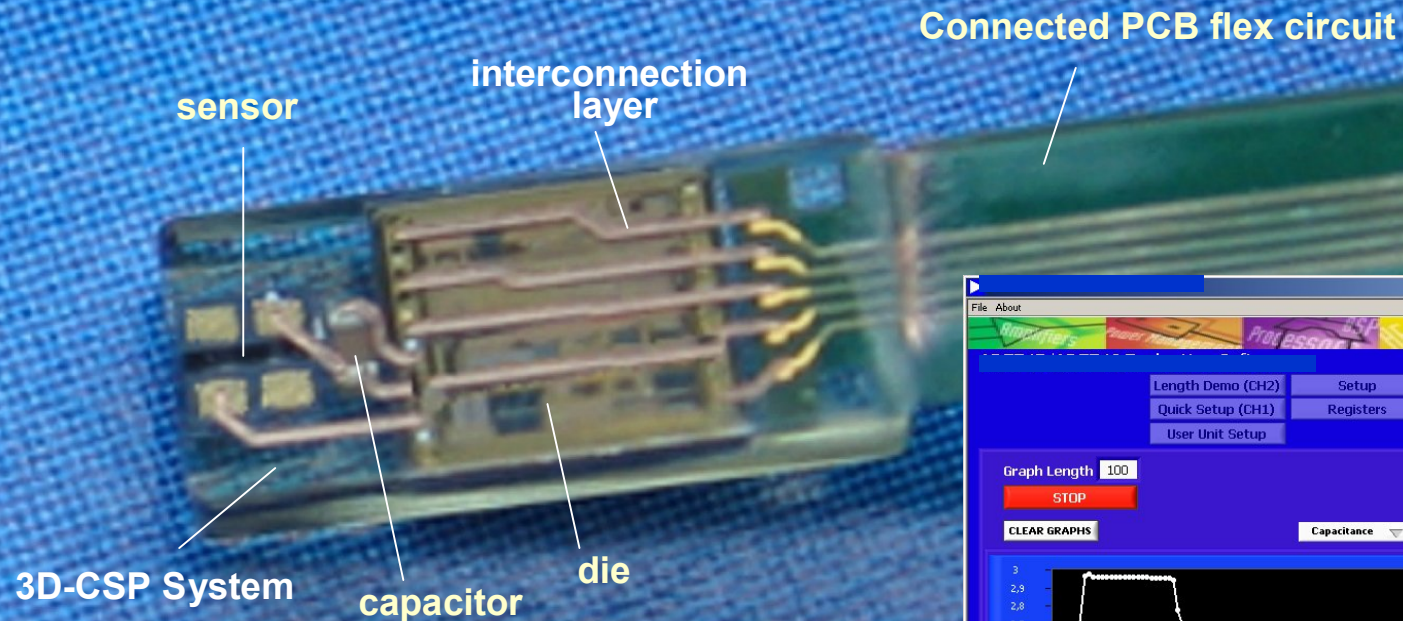


4 Step Process to build MEMS

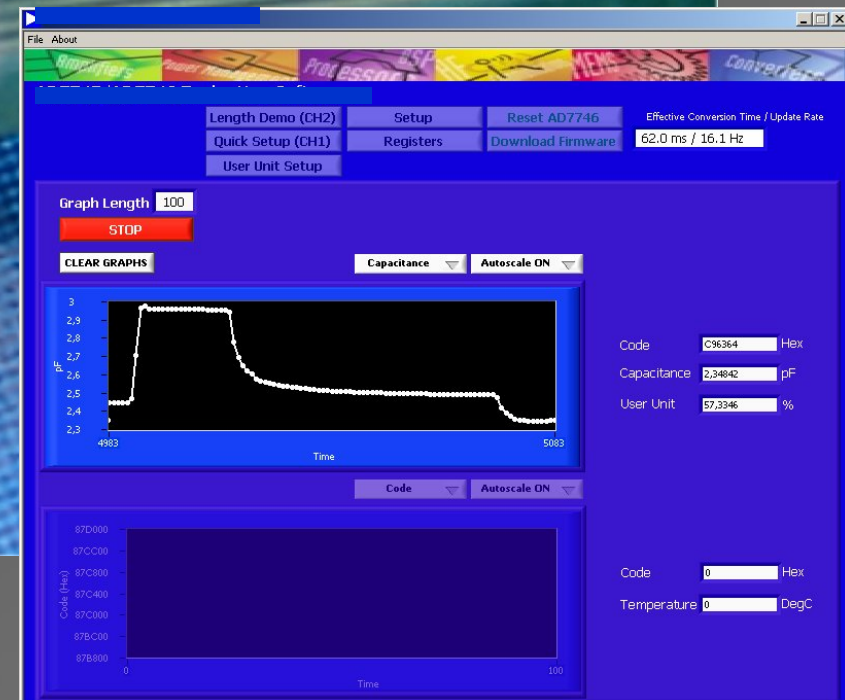
1. RMPD® -Mask
2. Placement of inserts
3. Metallisation
4. **Metal Layer structuring**

Sensor with 24-Bit Capacitance – to Digital Converter

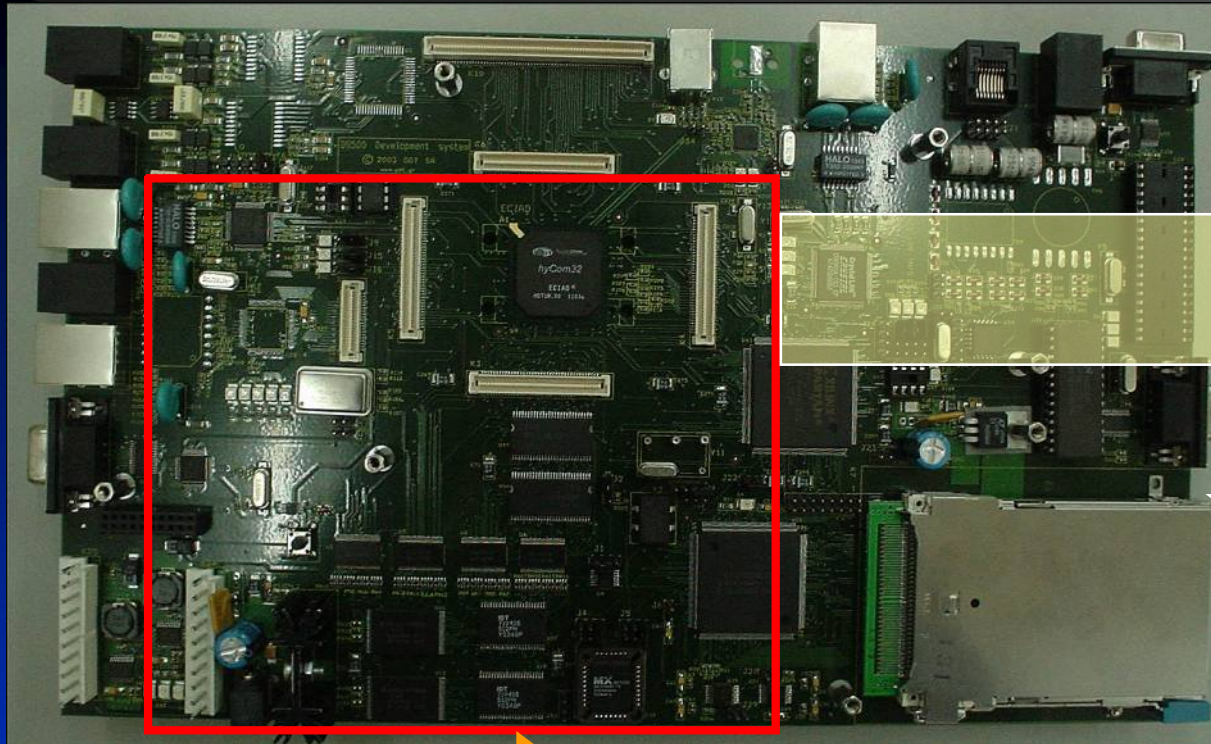
Technology: 3D-CSP with RMPD[®], special sensor adaptation with low interferences



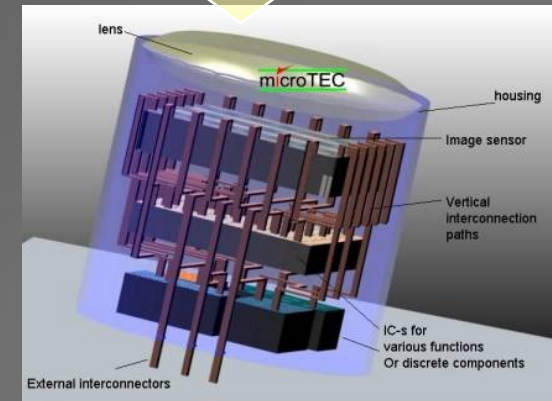
Temperatur sensor on chip resolution 0.1°C
Two wire serial interface (I²C- compatible)



System-in-Package Solutions based on 3D-CSP



Only processor and networking subsystem!

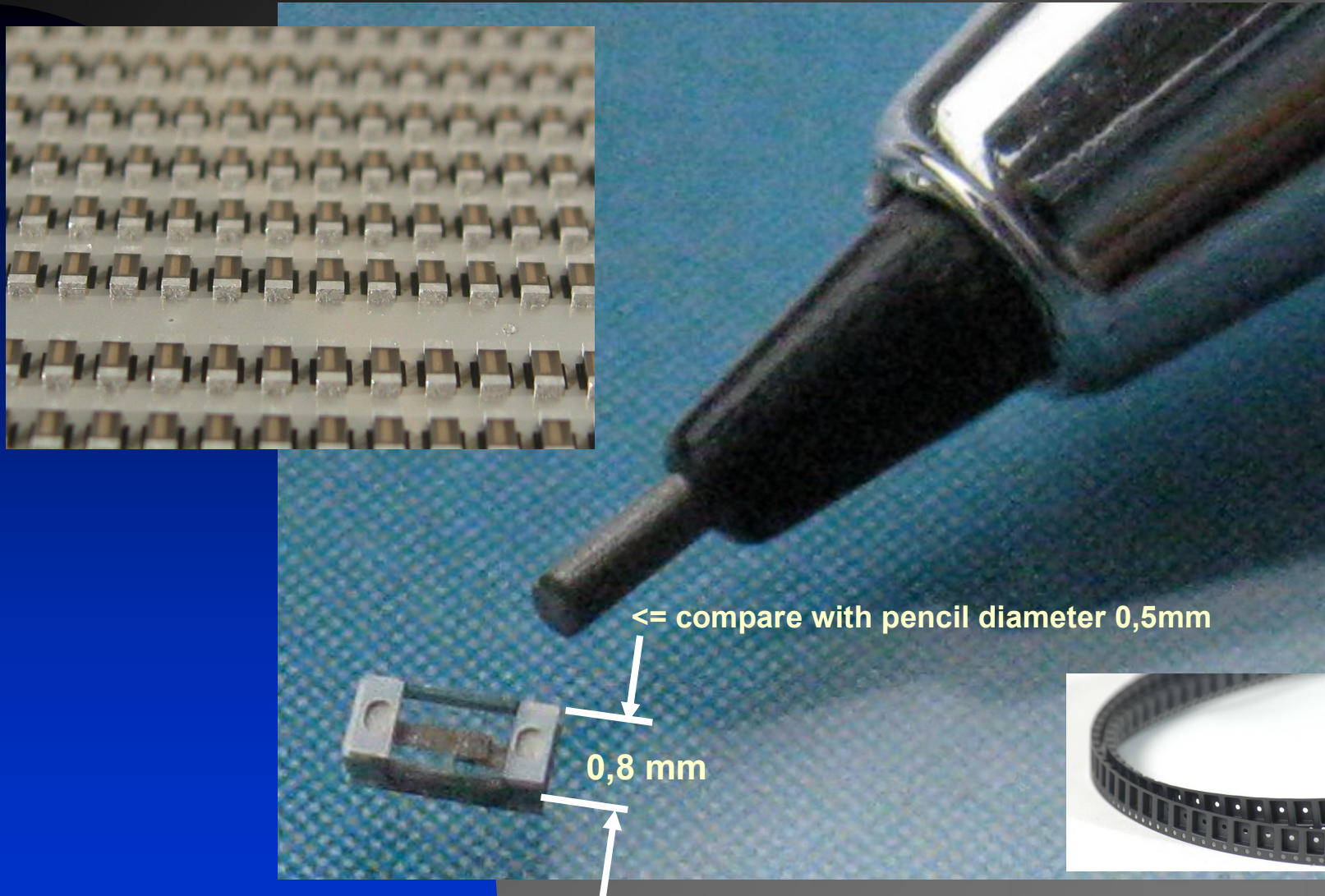


Intelligent Networked Optical Sensor

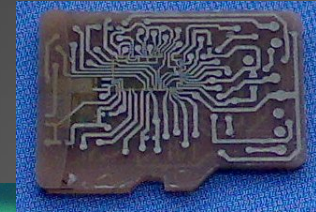
© microTEC Gesellschaft für Mikrotechnologie mbH 1996-2008



3D-CSP die housing for SMD case sizes 0603 and less



3D-CSP application: microSD SMART Card, stack NANDS up to 10 GB



Customers Advantages:

- One stop shop (full service: consulting, R&D, series production)
- Unique and patented technologies (IP security to customers), microTEC technologies and products are protected by patents, some of them are worldwide
- Capability to integrate market and customer needs very early in product development but without additional costs (CAD to series product) and Speeding up time to market (no tooling)

Image and Database:

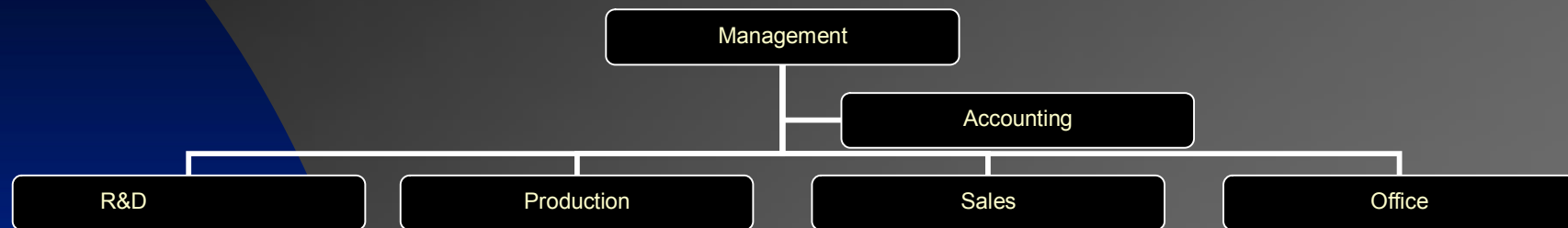
microTEC is well known as technology and innovation leader, in 12 years we build up a database of more than 20 thousand qualified decision makers with interest in MEMS and nanotechnologies. microTEC sales today is focussing 80 companies. Our trademark is international protected too.

microTEC Website:

More than 60 thousand visitors from 45 countries every year



Organisation



Management:

A. Reinhardt, R. Götzen, H. Bohlmann

Team:

high qualified employees, >50% Engineering degree

Shareholder:

48% = IKB Equity Fund I - IKB Deutsche Industriebank AG

52% = (Dr. U. Bittner, Dr. Ing. H. Bohlmann, Dipl. Ing. R. Götzen, A. Reinhardt, Dipl. Ing. J. Rost)



Management and Advisory Board

Dipl. Ing. Reiner Götzen, CEO/CTO

Inventor and founder of microTEC. He worked as scientist at University Duisburg, technical designer photo systems at Robot GmbH Düsseldorf and started his career at Thyssen Krupp AG in the field of precision mechanics. Mr. Götzen is working for microTEC since 1996 and is the driver of the innovations realized in the last 12 years, particular the international patented production technologies and the customer projects.

Andrea Reinhardt, CEO/CFO

Educated at University Mannheim she worked in leading position at Real-Film Ludwigshafen and started her career in Banking Citibank Mannheim and DGZ Bank Frankfurt. She is working for microTEC since 1996, with focus on business development. Mrs. Reinhardt is co-founder of NTC Nano Tech Coatings GmbH, is active as evaluator for EC and national projects, is part of the European Platform of Micro- and Nanotechnologies MINAM as member of the industrial board and at the public private partnership ZIRP www.zirp.de.

Dr. Ing. Helge Bohlmann, Power of attorney, project manager EC and sales

He worked as a scientist at University Hannover, as project manager for IVAM and as sales manager for UBM measuring systems. Dr. Bohlmann is working for microTEC since 2000 and is taking care of the EC funded projects and key customers.

Advisory Board

Dr. Lutz-Dieter Thiele: worked in top management positions at Omron Europa GmbH and Linotype-Hell AG. He is working as management consultant today.

Dr. Udo Bittner: worked in management positions at Siemens AG, Start Amadeus Ltd, Deutsche Post AG he is now working for Thomas Cook AG in a position of higher management.

Dr. Udo Sonnhof, Founder and Managing Director of SPI GmbH, Robotics and Optical Systems;



microTEC
Gesellschaft für
Mikrotechnologie mbH

**Thank you for your attention,
don't hesitate to contact us for details!**

**Andrea Reinhardt +496322650220
Reiner Götzen +492033062050
<http://www.microTEC-D.com>**

