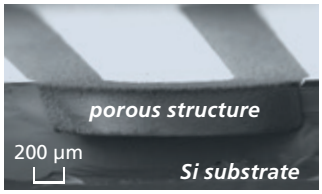
PowderMEMS Technology – Microfluidics

Porous 3D Microcomponents for Innovative Microsystems



Wafer with porous microfluidic channels

Fraunhofer ISIT PowderMEMS enables unique advantages for your MEMS solutions

- 3D structures up to 600 µm thickness on wafer-level
- Precise structural dimensions between 20 µm and 4000 µm
- Numerous degrees of freedom, conductive, thermal and magnetic properties, porosity and 3D-geometry
- Surface finish of porous structures adjustable by atomic layer deposition (ALD) technology
- Advantages compared to other manufacturing techniques: low process temperatures, thermally and chemically resistant structures, BEOL-compatible pre- and post-processing

PowderMEMS Technology

Fraunhofer ISIT has developed a patented process to create three-dimensional porous microstructures from a multitude of materials on wafer-level. The technology enables the integration of porous structures in microfluidic channels, on electrodes, as thermal insulation and numerous other features for next-generation microsystems. PowderMEMS accesses the third dimension on wafer-level for the design of porous microstructures with decisive advantages compared to other techniques like sintering or polymeric binding. Various parameters can be taken advantage of, such as the choice of powder material, the surface finish, the creation of three-dimensional shapes and the ability to pre- and post-process with established MEMS cleanroom technologies.

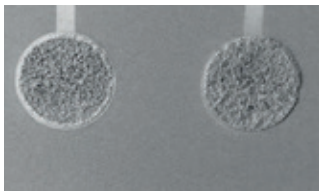
Examples of Applications: Lab-on-a-Chip / Sensors

- Filters / Mixers / Scaffolding
- Support for enzyme immobilization / Enzyme electrodes
- Large surface area catalyst for microreactors / Gas sensors
- Microscale thermal insulation of MEMS structures

PowderMEMS Technical Specifications

Structure lateral dimensions	20 µm to 4000 µm
Structure thickness	40 µm to 600 µm
Applicable powdered materials	Metals, Ceramics, Composites, etc…
Surface finishes (ALD)	Oxides and Nitrides e.g. SiO_2, SnO_2*, Al_2O_3, Si_3N_4*
Process temperature	75 °C to 300 °C
Compatible with cleanroom post-processing	yes

*ALD process planned/under development



Detail of permeable porous channel

Porous electrodes for electrochemical sensors

Contact us to explore the advantages of our technology in your application

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