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Prominent
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JOINT UNDERTAKING

High-density RDL and TSV fabrication using super inkjet technology for MEMS device

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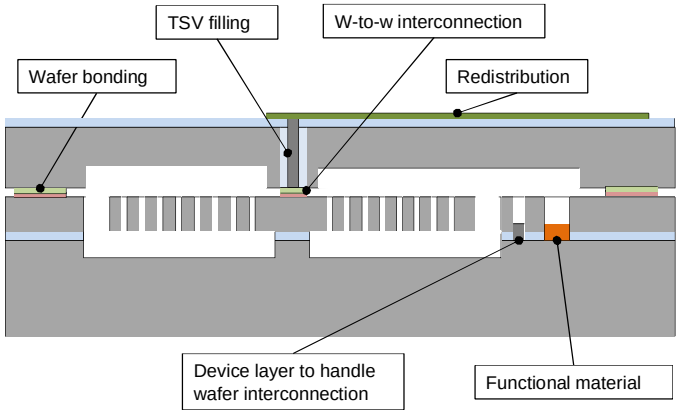
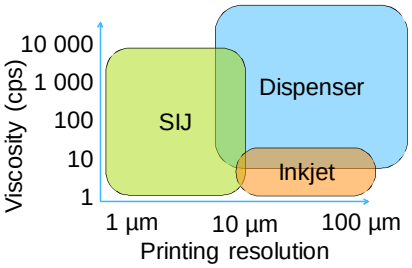
General description

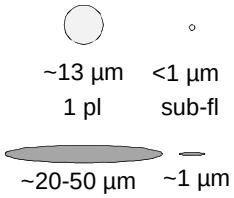
Printed electronics achieved recently considerable progress due to new printing technologies and to the introduction of nanoparticle inks, paving the way towards integrating its capabilities within the silicon-based nanoelectronics. The objective of the ENIAC JU project PROMINENT is to demonstrate significant cost reduction in MEMS manufacturing by using printing technologies to reduce materials, chemicals and energy consumption, waste water production, processing cycle time and capital investments.



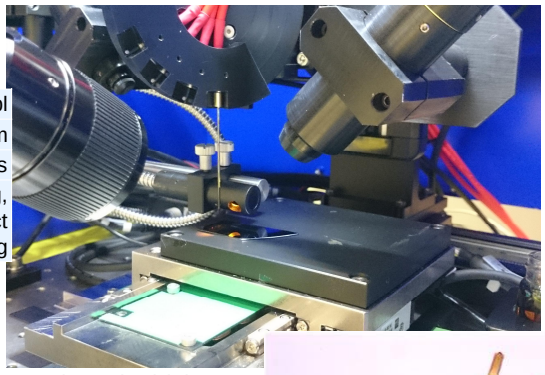
Need for SIJ technology

The ***physics*** of the printing technologies, e.g. conventional inkjet printhead, will be limiting the minimum feature size in near future. Smaller feature sizes enable e.g. fabrication of more efficient and faster devices

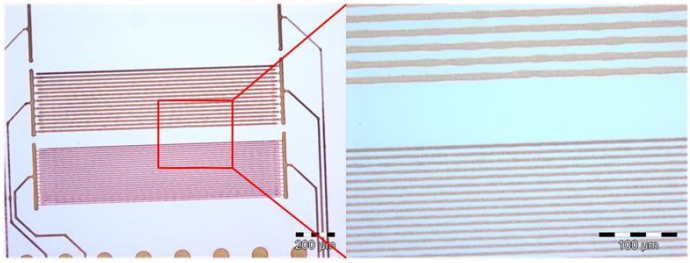




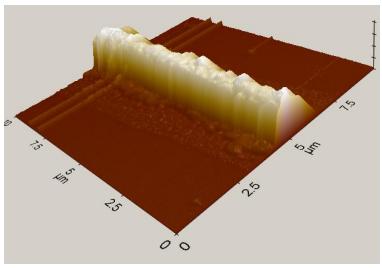
Firing vol.	0.1 fl - 10 pl
Line width:	0.5 µm—100 µm
Viscosity range	0.5 cps —10,000 cps
other	3D structure (pillar) forming, high-precision impact positioning



High-density printing



Narrow lines (10 µm, 5 µm)

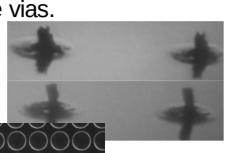


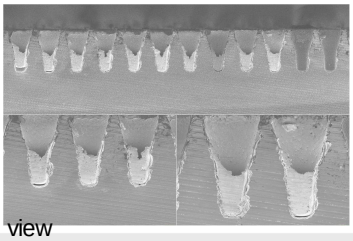
AFM: 2 µm line.

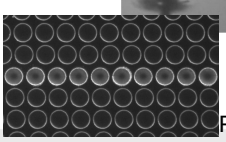
Through Silicon Via

Nowadays, TSV are used in 3D interconnections in high-density microelectronics devices. TSVs are fabricated using chemical vapor deposition (CVD) or electroless deposition to fill the vias.

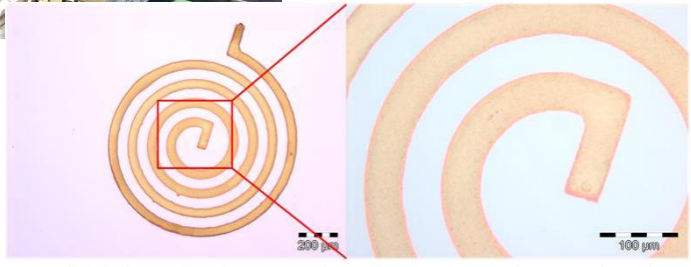
3D structure







Filled vias top view



Coil fabricated using SIJ. The edges are much smoother than with conventional inkjet can handle.

Additional information

- Laurila, M.-M.; Mäntysalo M.; Inkjet Printed Single Layer High-density RDL for a MEMS Device, in Proc. of ECTC 2015
- Khorramdel, B.; Laurila, M.-M.; Mäntysalo, M.; Metallization of high density TSVs using super inkjet technology in Proc. of ECTC 2015

- www.prominent-mems.eu

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