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FNSNF

Polymer-coating of membrane surface stress sensors (MSS) using inkjet spotting

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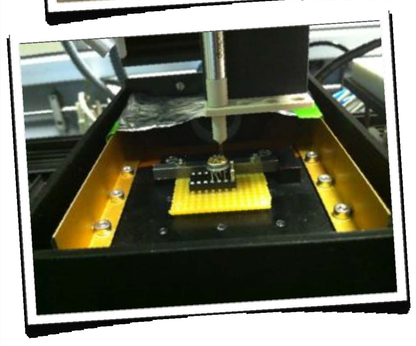
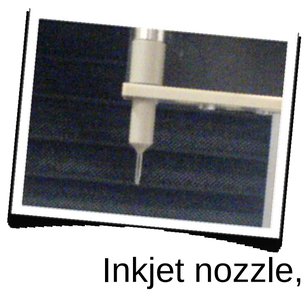
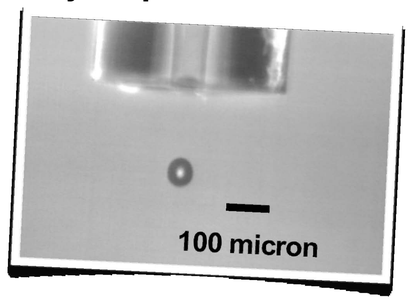
SNI SWISS NANOSCIENCE INSTITUTE
EINE INITIATIVE DER UNIVERSITÄT BASEL UND DES KANTONS AARGAU

1. Inkjet spotting

Microdrop Inkjet Spotter

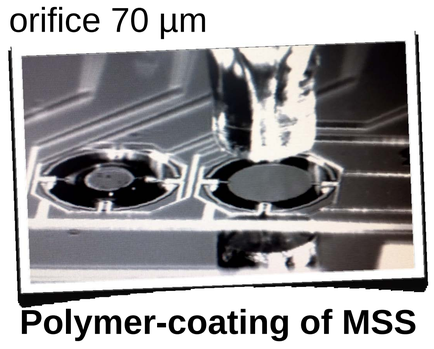






Inkjet nozzle, orifice 70 µm

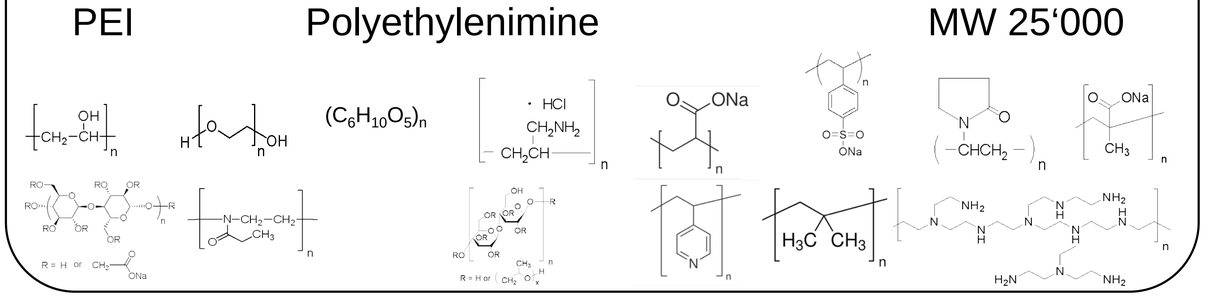
Well-controlled **functionalization** of the sensors is essential for their **reliable** operation. Here we apply **inkjet printing** as a rapid and reproducible method to coat cantilever sensor arrays efficiently with various polymer sensing layers.



Polymer-coating of MSS

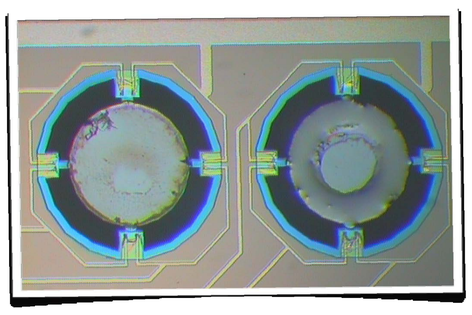
2. Polymers coatings

PVA	Poly(vinyl alcohol) Mowiol 10-98	
PEG	Poly(ethylene glycol)	MW 6‘000
Dextran	from Leuconostoc spp.	MW 15-20‘000
PAAM	Poly(allylamine hydrochloride)	MW 15‘000
PAA	Poly(acrylic acid sodium salt)	MW 5‘100
PSS	Poly(sodium 4-styrenesulfonate)	MW 70‘000
PVP	Polyvinylpyrrolidone	
PMAA	Poly(methacrylic acid)	MW 5‘400
CMC	Carboxymethylcellulose sodium salt	
PEO	Poly(2-ethyl-2-oxazoline)	MW 50‘000
PEG MEMA	Poly(ethylene glycol) methyl methacrylate	1‘100
HPC	Hydroxypropyl cellulose	MW 80‘000
PAA-AA	Poly(acrylic acid) acrylamide	
PVPy	Poly(4-vinylpyridine) (in EtOH/H_2O)	MW 160‘000
PIB	Polyisobutylene (in toluene)	MW 500‘000
PEI	Polyethylenimine	MW 25‘000

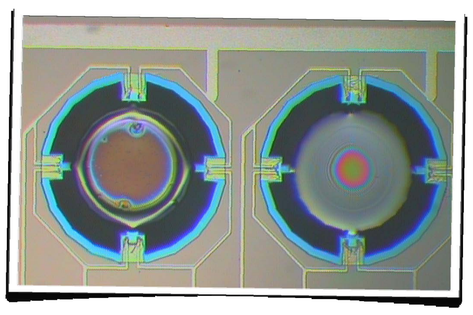


3. Results (polymer layer morphology)

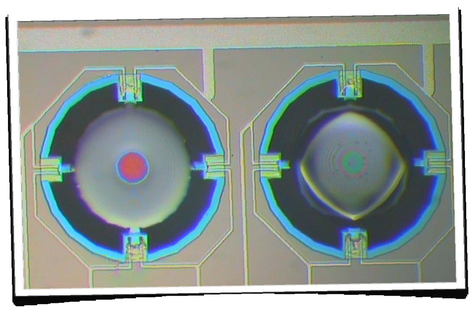
Deposited layers: 1000 (10 x 100) droplets of 200 pL of polymer solution
Concentration:1 mg / mL in water
Deposition parameters: voltage 70 V, pulse width: 35 V, 10 Hz



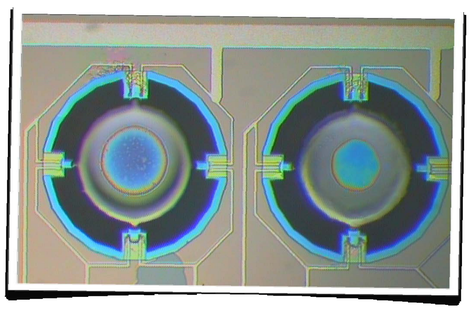
PVA PEG



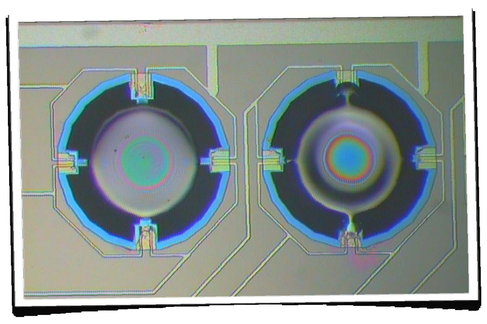
Dextran PAAM



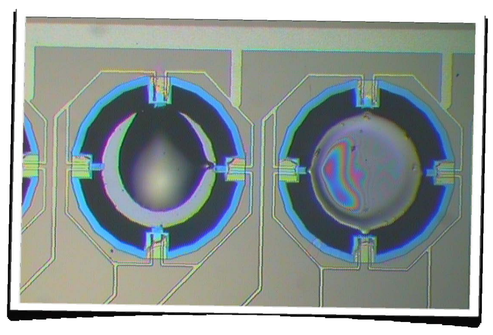
PAA PSS



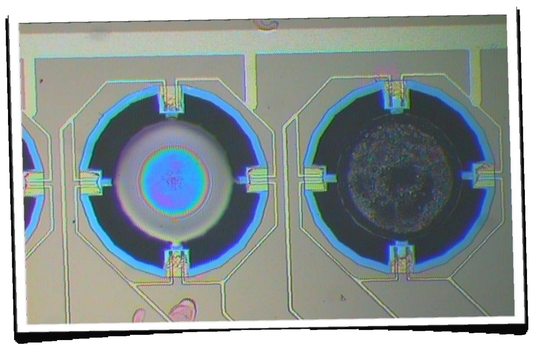
PVP PMAA



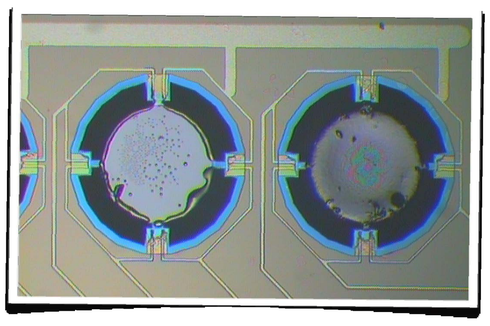
CMC PEO



PEG MEMA HPC

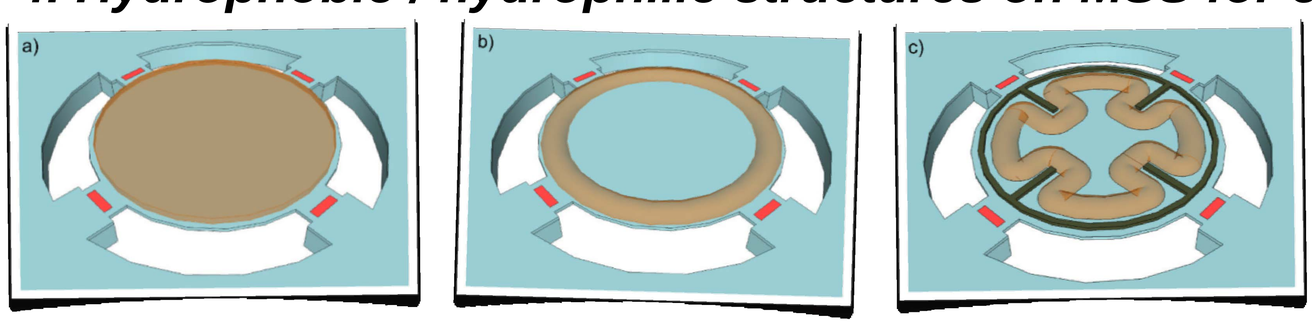


PAA-AA PVPy



PIB PEI

4. Hydrophobic / hydrophilic structures on MSS for enhanced wetting properties



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a) Ideal polymer coating: homogeneous layer
b) Coffee-stain effect: polymer accumulates at the membrane boundary
c) Enhanced wetting through hydrophobic and hydrophilic structures