

Projects at the EPFL Center of MicroNanoTechnology

DOD INKJET PRINTING OF FUNCTIONAL POLYMERS

M. Kiaee, J.Brugger, T.Maeder, (STI-IMT-LMIS1)
Microsystems Laboratory 1, EPFL

Project objective:

Inkjet printing techniques have gained a lot of attention for the micro-structuring of functional materials. This is due to their low cost, low material consumption and relatively easy fabrication process.

In this project, Drop-on-Demand (DOD) inkjet printing is used as a means of depositing gas-sensitive polymer nanocomposites on interdigitated electrodes. Different shapes and patterns (e.g. lines and films) can be printed by controlling the coalescence of the neighboring droplets. The final topography of the printed structure depends strongly on parameters such as ink formulation, surface properties of the substrate as well as printing parameters.

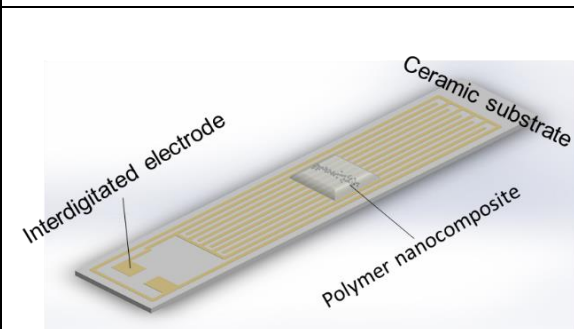


Figure 1: Schematic drawing of an inkjet-printed polymer nanocomposite on an interdigitated electrode which is used for gas detection

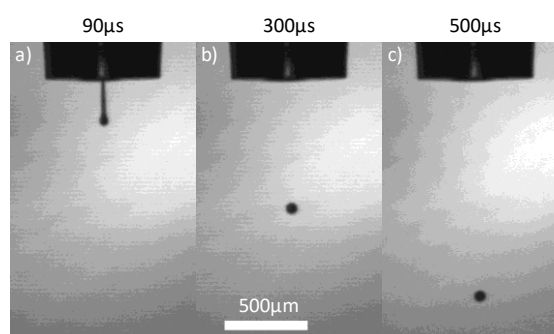


Figure 2: The process of droplet formation in our DOD inkjet-printer, a) 90 μs, b) 300 μs and c) 500 μs after the drop generation pulse is sent to the nozzle

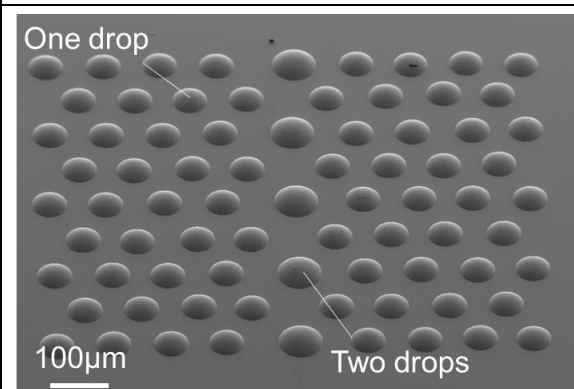


Figure 3: SEM image of an array of single and double inkjet-printed droplets on a Si substrate

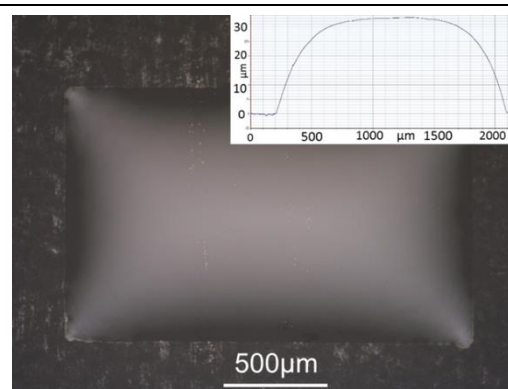


Figure 4: Smooth film inkjet-printed on a ceramic substrate, the inset is the surface profile of the film measured by the Bruker Dektak XT profilometer

Techniques employed: Inkjet printing (Microfab. DOD inkjet-printer), Mechanical profilometer (Bruker Dektak XT)

Funding: SNF.