



Nano / Microfluidic Approach to Inkjet Nozzles

J. A. Rogers, University of Illinois at Urbana-Champaign



Non-contact solution printing methods such as thermal or piezoelectric inkjet are attractive due to their compatibility with various materials and substrates. Interests in their applications in electronics and biotechnology, where requirements on resolution can be demanding, have grown rapidly in recent years. We have successively developed an electrohydrodynamic jet (e-jet) printing method in which diverse functional organic / inorganic inks (single walled carbon nanotubes, nanoparticles, conducting / insulating polymers, etc) can be ejected with submicron printing resolutions [1]. This printing technique can be used for fabrication of flexible transistors as an application example in electronics [1]. And this method can be used for single or double stranded DNA printing with high resolution approaching 100 nm (lateral feature size) [2]. DNA aptamer-based biosensors and DNA-programmed nanoparticle assembly that use spotted arrays of DNA were demonstrated for applications in biotechnology [2]. Also, this e-jet system is capable of printing charged liquids with polarities selectively controlled by electric field directions.

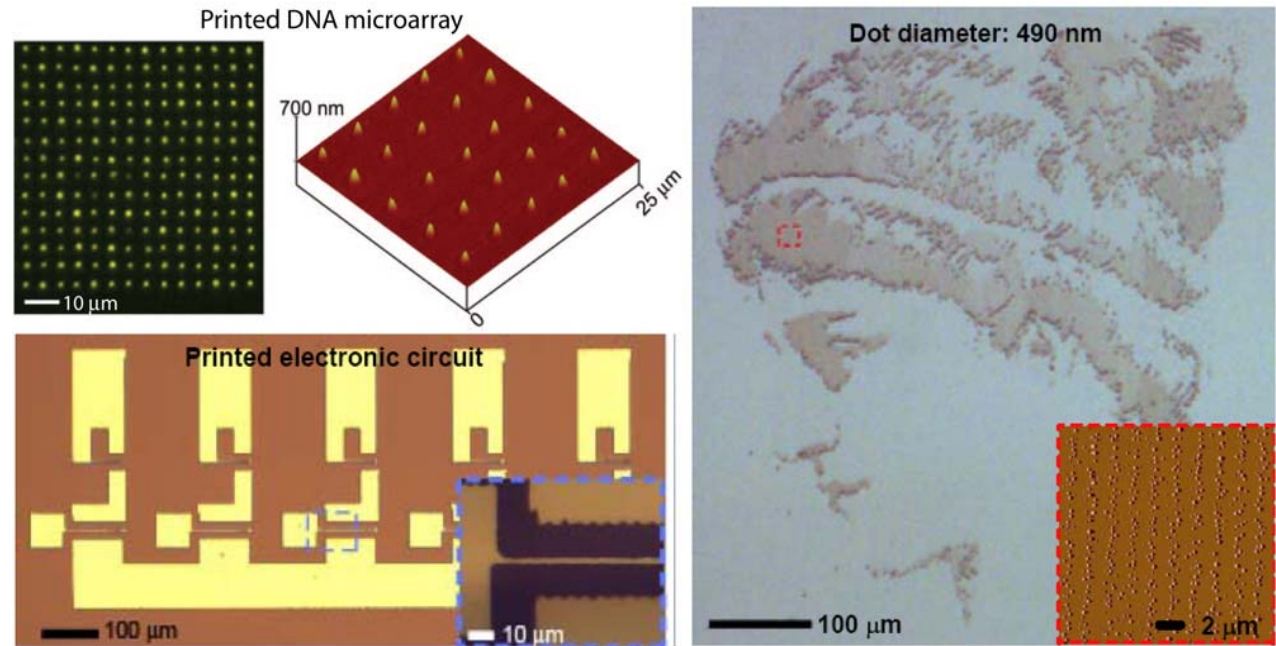


Figure 7.3: Examples of DNA microarrays, electrical circuits and micro tags printed by the high resolution electrohydrodynamic jet printing process.

- [1] J. -U. Park, M. Hardy, S. J. Kang, K. Barton, K. Adair, D. Kishore, C. Y. Lee, M. S. Strano, A. G. Alleyne, J. G. Georgiadis, P. M. Ferreira, J. A. Rogers, "High Resolution Electrohydrodynamic Jet Printing with Application Examples in Printed Electronics", *Nature Mater.* 6, 782-789 (2007).
- [2] J. -U. Park, J. H. Lee, U. Paik, Y. Lu, J. A. Rogers, "Nanoscale Patterns of Oligonucleotides Formed by Electrohydrodynamic Jet Printing with Applications in Biosensing and Nanomaterials Assembly", *Nano Lett.* 8, 4210-4216 (2008).