Nanocontact Electrification: Effects on Adhesion, Transfer, and Printing

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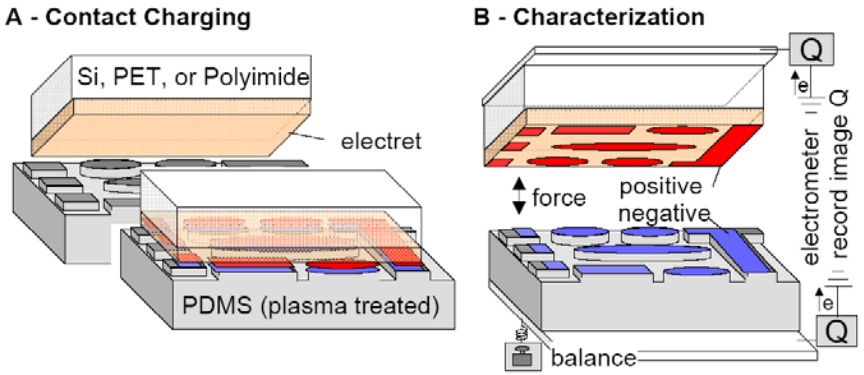
NNIN Facilities utilized: Characterization Facility & Nanofabrication Center

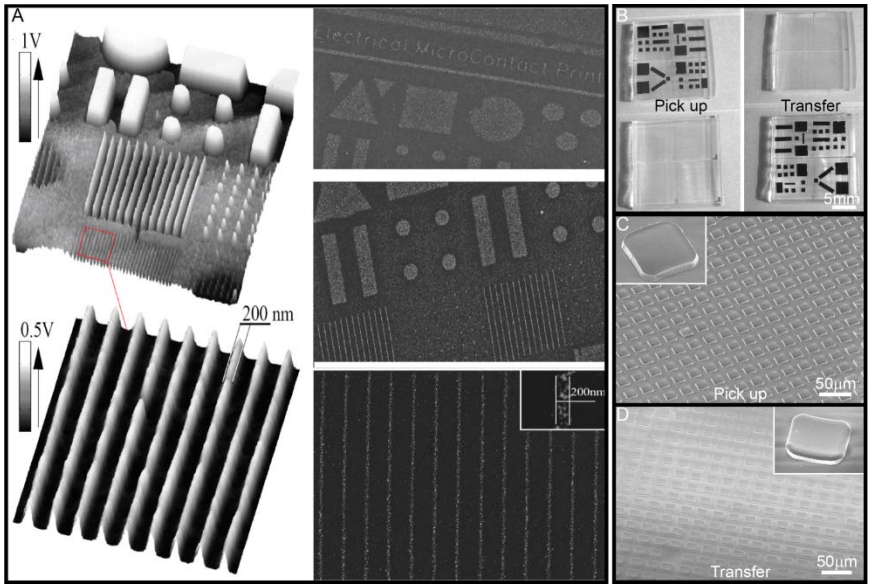
DESCRIPTION OF WORK

- Designed a contact electrification process in which a dielectric coated substrate is placed in contact with oxygen plasma-treated patterned PDMS
- Charge transfer occurs at the areas of contact between both materials
- Charge transfer influences electrostatic force of adhesion
- An electrometer records the amount of accumulated image charges on metallic plates holding both the substrate and stamp
- A connected balance records the force on the stamp as the charged substrate is separated, and then again during reapproach



MAJOR OBSERVATIONS

- Through molecular surface functionalization, nanoscopic charge patterns are demonstrated that yield long range electrostatic adhesive forces exceeding the dielectric breakdown strength of air.
- At this magnitude, the force significantly directs the deposition and transfer of nanomaterials all the way up to macroscopic objects.



Publications

- Chad R. Barry, Jesse J. Cole, Robert J. Knuesel, Xinyu Wang, and Heiko O. Jacobs, *Adv. Mat.*, manuscript submitted (2009)