# Continuous Nanoparticle Generation and Deposition by Arc Discharge

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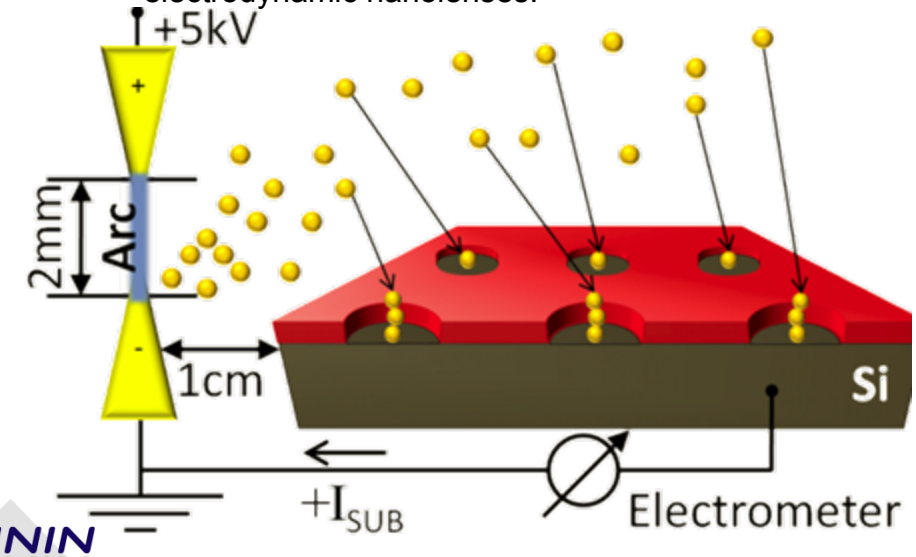
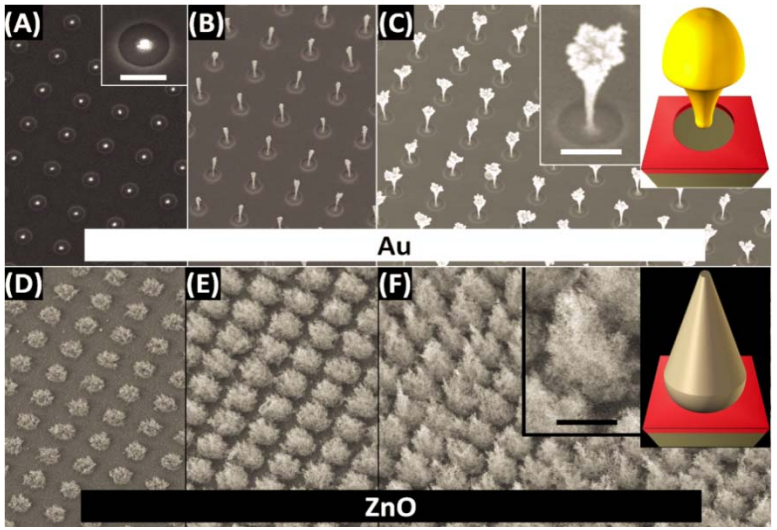
## DESCRIPTION OF WORK

- We discovered a nanoparticle generation and deposition system which combines aspects of high temperature plasmas with room temperature aerosols.
- The process works at atmospheric pressure and produces nanoparticles of Au or ZnO through cathode erosion inside a dc arc discharge plasma.
- The particles are positively charged by the arc and form a room temperature aerosol.
- From the aerosol, nanoparticles assemble on conductive sample surfaces through openings in patterned resist with resolution enhanced by electrodynamic nanolenses.




## MAJOR OBSERVATIONS

- We reported that continued operation of the system results in funneled deposition of nanoparticles into well positioned three dimensional nanostructures.
- We demonstrate that particles can be plated vertically into pores (min. resolution 60nm) or laterally to form low resistivity (48 μΩ-cm) interconnects.




## Publications


- Jesse J. Cole, En-Chiang Lin, Chad R. Barry and Heiko O. Jacobs, *Appl. Phys. Lett.*, 95, 113101 (2009).
- Jesse J. Cole, En-Chiang Lin, Chad R. Barry and Heiko O. Jacobs, *Small*, (2010) In Press.