

Abstract Submitted  
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**Dielectrophoretic Trapping of Au Nanoparticles using High Quality Nanogap Electrodes** YE LU, DANVERS E. JOHNSTON, DOUGLAS R. STRACHAN, BETH S. GUITON, PETER K. DAVIES, TAE-HONG PARK, MICHAEL J. THERIEN, A. T. CHARLIE JOHNSON, University of Pennsylvania — In the past decade, single molecule-based electronic devices have drawn enormous attention. One of the great challenges to be overcome is the fabrication of well-defined, uncontaminated nanogap electrodes, and the subsequent assembly of individual molecules or nanoparticles onto the contacts. A promising route to this goal is the feedback controlled electromigration (FCE) process, which can be used to create stable, metal-particle free nanogap contacts at temperatures ranging from 4–300 K.<sup>1,2</sup> Here we describe experiments where Au nanoparticles (NPs) are assembled inside FCE fabricated nanogaps by using positive AC dielectrophoresis (DEP). Specific challenges relating to circuit design for efficient DEP and solutions to these challenges are discussed. Additionally, substrate interactions are found to substantially influence dielectrophoretic assembly. Methods for controlling DEP assembly by modification of the electrostatic interaction between NPs and substrate surfaces are explored. Funding: NSF-NSEC/NBIC DMR-0425780. <sup>1</sup>D. R. Strachan et al., *Appl. Phys. Lett.* **86** 043109 (2005). <sup>2</sup>D. R. Strachan et al., *Nano. Lett.* **86** 043109 (2006).

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