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Rapid DNA Idetification by Dielectrophoresis of Nanocolloids ZACHARY GAGNON, SATYAJYOTI SENAPATI, JASON GORDON, HSUEH-CHIA CHANG, Dept. of Chemical and Biomolecular Engineering, University of Notre Dame — Due to their size and number, dispersed oligo-functionalized nanocolloids can reduce the diffusion length/docking time and increase the sensitivity of ssDNA hybridization reactions by orders of magnitude compared to immobilized probes. We find that, for long target ssDNAs, their docked conformation is a sensitive function of the nanocolloid size, surface charge, functionalized probe density and number of docked DNAs per bead. Three distinct conformations (collapsed, stretched and condensed) are detected via independent light scattering, Zeta potential, dielectrophoresis (DEP) and electron micrograph techniques. By optimizing the hybridization conditions to produce a stretched conformation, we are able to significantly change the DEP cross-over frequency of hybridized beads, thus allowing rapid label-free detection of hybridization by simple impedance techniques down to pM concentrations.

> Zachary Gagnon Dept. of Chemical and Biomolecular Engineering, University of Notre Dame

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