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Nanoscale Assemblies of Fluorescent, Few-Atom Silver Clusters[1]

STACY COPP, Physics Department, University of California Santa Barbara, DANIELLE SCHULTZ, Chemistry Department, University of California Santa Barbara, NEMANJA MARKESEVIC, Huygens Laboratory, Leiden University, KIRA GARDNER, Physics Department, University of California Santa Barbara, SUMANT OEMRAWSINGH, Huygens Laboratory, Leiden University, DIRK BOUWMEESTER, Physics Department, University of California Santa Barbara; Huygens Laboratory, Leiden University, ELISABETH GWINN, Physics Department, University of California Santa Barbara — Silver clusters with sizes small enough to display high fluorescence quantum yields can be stabilized by DNA. These clusters show evidence for rod-like structure [1], opening up possibilities for new functionalities based on structure-modulated near-field patterning and anisotropic polarization response. We develop DNA clamps to hold two silver clusters composed of 10 and 15 atoms in nanoscale proximity, while retaining the individual structure of each cluster [2]. Thermally modulated fluorescence resonance energy transfer (FRET) verifies assembly formation, with clusters held 5 - 6 nm apart, in the range of the best resolution that can be achieved in DNA scaffolds. The absence of spectral shifts in these dual-cluster FRET pairs, relative to the individual cluster spectra, shows that few-atom silver clusters of different sizes can be sufficiently stable to retain their structural integrity when held within a nanoscale DNA construct. [1] D. Schultz, *et al.*, Adv. Mater. **25**, 2797 (2013) [2] D. Schultz, *et al.*, ACS Nano, ASAP (DOI: 10.1021/nn4033097).

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