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Tayloring the localelectronic and structural properties of colloidal nanocrystals MARIA LONGOBARDI, University of California, Berkeley, LBNL and University of Salerno, Italia, MATT SHELDON, TOMOYA ARAI, University of California, Berkeley and LBNL, ALESSANDRO SCARFATO, University of Salerno, Italia, A. PAUL ALIVISATOS, MICHAEL F. CROMMIE, University of California, Berkeley and LBNL — Recent advances in wet-chemical synthesis techniques allow unprecedented control of the composition, size, shape, and surface chemistry of colloidal nanocrystals. The structural, opto-electronic and magnetic properties of these materials can be tailored to enable new quantum phenomena with applications in biology, energy harvesting, and fundamental physical studies. Moreover, sophisticated understanding of colloidal nanocrystals requires local probes of individual particles, such as scanning tunneling microscopy (STM) and spectroscopy (STS), that can measure the local density of states (LDOS) and particle wave-functions in real space with atomic resolution. Here, we present our STM/STS studies of the structural and electronic properties of individual CdS, Cu2S and binary CdS/Cu2S heterostructure nanocrystals. Detailed local study of electronic properties of the nanocrystals could bridge the existing knowledge gap between bulk and nanoscale. Such understanding is crucial for the design of novel materials based on colloidal nanocrystals.

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