The Vela group is interested in the fabrication, characterization, and properties of novel heterostructured nano materials. Our aim is to lead the design of distinct, powerful and widely applicable synthetic strategies that span the continuum between the molecular, nano, bulk scales, and that enable effective processing and incorporation of new materials into energy conversion, catalysis, and biological imaging and tracking. This talk will highlight our group’s most recent results in two areas related to semiconductor nanocrystals, namely: bottom up nano fabrication via precursor reactivity fine-tuning through chemical group substitution (“molecular programming”), as well as the study and effects of nanocrystal valence, surface ligand organization and reactivity on quantum dot properties.