

## Synthesis of Metal -Incorporated Cadmium Chalcogenide Heterostructured Nanocrystals with Different Morphologies

\_\_\_\_\_,<sup>1</sup> Lawrence J. Hill<sup>2</sup>, Jeffrey Pyun<sup>2</sup>,<sup>\*</sup>  
; <sup>1</sup>Los Alamos National Laboratory; <sup>2</sup>University of Arizona  
(khchar@snu.ac.kr<sup>\*</sup>)

Colloidal heterostructured hybrid nanomaterials are of great interest due to the synergistic properties originating from different types of metal -semiconductor interfaces and thus lead to various applications such as photocatalysts, bioimaging and so forth. Here, we report on the synthesis of metal -semiconductor hybrid nanomaterials, more specifically platinum-tipped or -decorated cadmium chalcogenide nanocrystals with different morphologies including nanorods and tetrapods. Depending on the surface conditions of semiconductor nanocrystals, platinum metals nucleate and grow from either one- or both ends of semiconductor nanocrystals or all around the nanocrystal surface. We further demonstrate the incorporation of cobalt and cobalt oxide nanoparticles onto the platinum-tipped CdSe@CdS hybrid nanorods, where the terminal platinum NP tips selectively seed the growth of metal cobalt NP tips as either nano-matchsticks with one metal tip or dumbbells with two metal tips at both ends of nanorods. These hybrid nanorods show different self-assembly structures depending on the nature of nanorod or tetrapod metallic NP inclusions.