

605c Molecular Templates for Metal Sulfide Nanocrystal Synthesis: Controlling Fatty Acid Film Morphology by Metal Salts

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This paper describes a novel “molecular template” method for the synthesis of metal sulfide nanocrystal arrays on graphite surface. The main roles of the amphiphilic template are to maximize local concentration of metal ions and to restrict their diffusive mass transfer, both of which lead to the controlled synthesis of metal sulfide nanocrystal arrays. AFM is used to visualize the metal carboxylate soap bilayer pattern before and after the reaction of metal ions to hydrogen sulfide. Different metal ions are used for the bilayer template assembly in order to understand the effect of ion complexation on the domain and molecular structure of the carboxylate matrix. For example, cadmium arachidate displays large 2D crystalline domains, while manganese arachidate forms needle-shaped domains. Copper ions introduce significant disordering in the arachidate bilayer pattern. The bonding strength and anisotropy may also influence the formation and stability of sulfide nanocrystals.