

### Synthesis of Metal Sulfide Nanocrystals in Liquid Sulfur Medium

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Various synthetic routes have been suggested in the past to produce nanocrystals monodisperse in size and also with shape tunability. In many cases, however, large amount of expensive and hazardous reagents was often used in the synthetic process and these were considered to be the major hurdles of commercialization. Herein, we report simple synthetic route to produce well-defined metal sulfide nanocrystals using elemental liquid sulfur which is much cheaper and more environmentally friendly than any other conventional organic solvents used previously. In our synthetic process, liquid sulfur acts as a solvent and concurrently as a sulfur source. Addition of metal precursors/surfactant solution into liquid sulfur at 130 ~ 180°C leads to the formation of uniform sized metal sulfide nanocrystals. We will clarify the mechanism of these reactions by controlling concentrations of component materials and reaction temperature and then confirm the roles of each reagent. Consequently, the optimized conditions to obtain monodisperse nanocrystals will be proposed. In addition, we will demonstrate superior optical properties of these well-defined nanocrystals through various optical characterization methods.