ABSTRACT

SYNTHESIS OF ALLOYED NANOCRYSTALS IN AQUEOUS OR WATER-SOLUBLE SOLVENTS

The present invention relates to nanocrystals and methods for making the same; in particular, the invention relates to ternary or higher alloyed nanocrystals and methods for making such structures in aqueous or water-soluble solvents. In certain embodiments of the invention, methods of preparing ternary or higher alloyed nanocrystals involve providing at least first, second, and third nanocrystal precursors (e.g., NaHSe, $ZnCl_2$, and $CdCl_2$) and forming nanocrystal structures in an aqueous or water-soluble solvent. In some cases, nanocrystal precursor solutions may also include a water-soluble ligand (e.g., glutathione, GSH). As such, ternary or higher alloyed nanocrystals (e.g., $Zn_xCd)-_xSe$) comprising the at least first, second, and third nanocrystal precursors may be formed, and the water-soluble ligand may coat at least a portion of the surface of the ternary or higher alloyed nanocrystal. Advantageously, methods for forming nanocrystals described herein can be performed at low temperatures (e.g., less than 100 degrees Celsius), and, in some embodiments, do not require the use of organic solvents. The present inventors have applied these methods to prepare blue-emitting nanocrystals with emissions that are tunable between 400-500 nm, and with quantum yields of greater than 25% in aqueous solution. These nanocrystals may be highly water soluble and can be used in a variety of applications, including those involving cell culture, sensing applications, fluorescence resonance energy transfer, and in light-emitting devices.

FIG. 5A



162162



G00002