

Colloidal Synthesis of Ferromagnetic  $\text{CuCr}_2\text{S}_4$  Nanocrystals and Nanoclusters

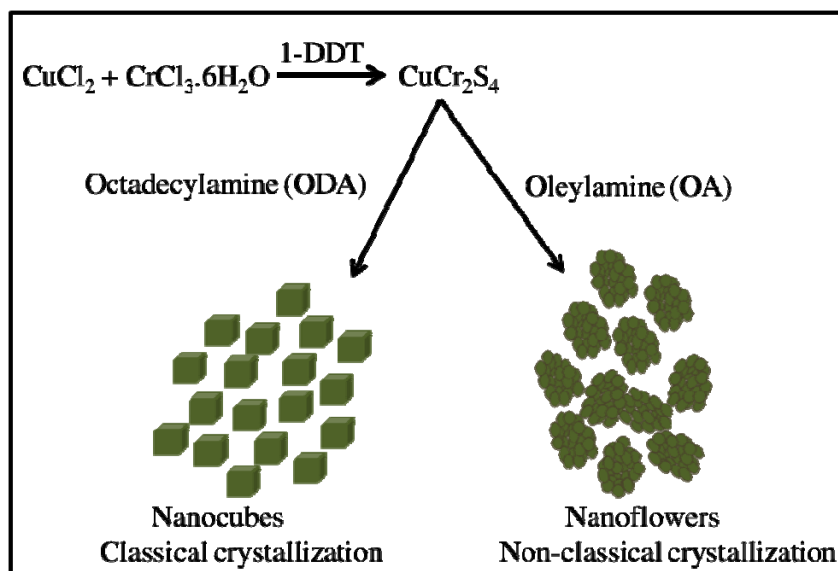
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Nanocrystals and nanoclusters of room temperature ferromagnetic spinel  $\text{CuCr}_2\text{S}_4$  have been synthesized by a facile solution-based method. The synthesis involves the injection of 1-dodecanthiol into a boiling coordinating solvent containing  $\text{CuCl}_2$  and  $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ . Using octadecylamine (ODA) as a solvent yields cube shaped nanocrystals with an average size of  $20 \pm 2$  nm, while with oleylamine (OA) flower-shaped nanoclusters with an average size of  $31 \pm 2.5$  nm are obtained. Powder X-ray diffraction patterns confirm formation of the pure spinel phase without any impurities in both cases. Magnetic measurements yield saturation magnetization ( $M_s$ ) values of 30 emu/g and 33 emu/g for the octadecylamine and oleylamine capped particles, respectively, at 5 K.



**References:**

- 1) Lotgering, F. K. *Solid State Commun*, **1964**, 2, 55;
- 2) Ramirez, A. P.; Cava, R. J. Krajewski, J. *Nature*, **1997**, 386, 156;
- 3) Muroi, M.; Street, R.; McCormick, P. G. *Physical Review B*, **2001**, 63, 052412.