

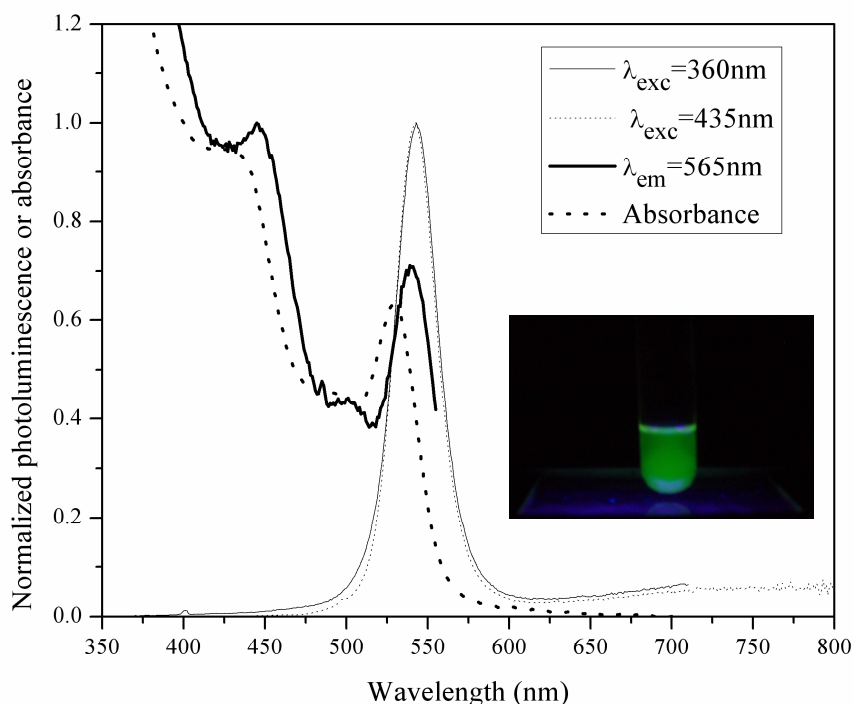
## CdSe Quantum Dots Using Polyselenide Precursor in Soft Chemical Conditions

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Semiconductor nanocrystals, also called quantum dots (QDs), are an emerging new class of powerful and versatile biomedical imaging probes. Their fluorescence is unique compared with that from traditional organic fluorophores. QDs exhibit high quantum yields, high photostability, large absorption coefficients, continuous absorption bands with narrow and symmetric emission for multicolor capability, and many biofunctionalisation strategies. Most of the preparation techniques use a tri-*n*-octylphosphine (TOPO) based system in which the reagents are injected into a high coordinating solvent at high temperature (200–400 °C) under nitrogen and moisture free atmosphere [1].

In this work, CdSe QDs were prepared by a simple microemulsion templating technique at low temperature (80°C), in ambient atmosphere, and using common inorganic precursors. Size control was obtained by small variations in reactant concentrations and pool size [2]. The chalcogenide source was a polyselenide solution in a polar aprotic organic solvent. Narrow (30-40nm fwhm) band gap photoluminescence with low defect level and high quantum yield were obtained. It was found that in order to obtain good quality QDs with reproducibility it is important the control of the time of reaction, the presence of tetraalkyl ammonium salt that probably acts as a phase transfer reagent, the tightness of the closure of the reaction tube and direct heating at the base of the reaction tube. The particle size was evaluated by an empirical correlation [3] and by TEM measurements.



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[1] J. Hambrock, et al, *J. Mater. Chem.* **11** (2001) 3197.

[2] Takumi Kinugasa et al, *Colloid Surf. A-Physicochem. Eng. Asp.* **204** (2002) 193–199.

[3] W. William Yu, L. Qu, W. Guo, X. Peng, *Chem. Mat.* **15** (2003), 2854.