

Continuous flow synthesis of semiconductor nanocrystals

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PhD may follow: Yes

Summary :

Colloidal semiconductor quantum dots (QDs) exhibit unique photophysical properties such as narrow and size-tunable emission, broadband absorption and high fluorescence quantum yields. Hence, QDs are already used in diverse applications like biological imaging/detection or as color converters in the white backlight of LCD displays used in high-end television screens. Because indium phosphide (InP) based QDs are in compliance with EU regulations (RoHS, REACH), they have been identified as the prime candidate for use in colour conversion LEDs. Size control is of paramount importance as the emission wavelength and electronic properties are directly related to the QD diameter. In this project, we want to develop a new continuous flow synthesis method for high quality indium phosphide based core and core/shell QDs of reduced size dispersion. Continuous flow synthesis has many advantages compared to conventional batch synthesis due to the much better mass and heat transfer in tubular reactors and higher reproducibility.

Characterization of the optical and structural properties is also part of the project using UV-vis and photoluminescence spectroscopy, X-ray diffraction and electron microscopy.

Full description :

Requested skills :

Materials chemistry, inorganic chemistry, physical chemistry