CONTINUOUS FLOW SYNTHESIS OF LEAD SULFIDE

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Abstract
Semiconductor nanocrystals show unique energetic, electronic and optical properties which depend tremendously upon their size. Latest reports have focused on lead sulfide - quantum dots (PbS-QDs) with diameters between 3 to 8 nm and appropriate excitonic peaks from 1000 to 1600 nm[1]. Due to small bandgap energies (0,8 to 1,2 eV) the optoelectronical transitions of PbS nanocrystals cover the near-infrared region. In addition, they absorb the whole wavelength range below 1000 nm and are highly resistant against heat- and bleaching. These properties predestine PbS-QD’s to be used for photovoltaic applications[2].

The classical synthetic routes enable the production of particles with proper homogeneous size dispersions, therewith narrow emission bandwidths and quantum yields around 50%[1],[3]. However, common hot-injection syntheses show various issues which can be eliminated by passing on to continuous flow systems. These methods assure definite concentration- and temperature-conditions and offer perfect mixing of the reactants. Due to this points, producing reasonable amounts of PbS (up to kg/year) with narrow size distribution and a high degree of reproducibility, is only possible and economically realizable by a continuous flow reactor.

Here we will present our progress in synthesizing fluorescent PbS-quantum dots by continuous flow methods. The regulation of particle growth and properties by varying temperature, flow speed and precursor parameters will be shown.

Keywords: continuous flow, lead sulfide, quantum dot, photovoltaic

LITERATURE:

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