Highly Photoluminecent Silica Nanotube with Embedded CdSe@ZnS QDs

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Herein, we report a successful preparation of silica nanotube with embedded highly fluorescent CdSe@ZnS quantum dots (QDs) by using alumina membrane as template. The embedding of QDs into silica nanotube is based on a straightforward application of inorganic-organic hybrid approach in room-temperature sol-gel synthesis, with replaceing of the organoalkoxysilane by using alkoxysilane-capped semiconducting QDs. The 3-mercaptopropyl-trimethoxysilane (MPS)-capped CdSe@ZnS core/shell structures were first prepared in two steps based on the original low-temperature synthetic method reported by us.1 The new method achieves ligand exchange and the core/shell formation "simultaneously" in a single step and thus avoids the possible decrease of quantum yield (QY) during the ligand exchange process. Scanning electron microscope (SEM) and transmission electron microscope (TEM), as well as energy dispersive spectroscopy (EDS) X-ray microanalysis, were used to characterize the as-prepared silica nanotube. The photoluminescence of the silica nanotube was measured by spectrafluorometer. The results show that the as-prepared silica nanotubes are highly photoluminescent with tunable length and wall thickness, which can be potentially used in optical and electronical devices.

References:

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