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Light-emitting properties of colloidal ZnO nanocrystals embedded in different polymer matrices

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There are many ways to protect nanocrystals from degradation and to improve NC properties. One of the most promising is embedding NCs in polymer matrices. NCs in transparent polymers is perspective material for applications in photonics and bio-imaging, thus investigation of their light-emitting properties is important. While NCs in conductive polymers attracts considerable attention due to the promising application for photovoltaics, electroluminescence, and photodetectors [1]. Here, we investigate the effects of embedding the ex-situ synthesized colloidal ZnO NCs [2] in different water-soluble polymers, such as polyvinyl alcohol (PVA), polyvinylpyrrolidone (PVP), polyethylene glycol (PEG), gelatine, and PEDOT:PSS. Embedding NCs in the polymer matrix causes changes in the shape of PL spectra and emission intensity, we infer possible recombination mechanisms of the NC PL and ways of the interaction between NCs and polymer. It was detected the common major effect of PVP, PEG, and PVA is suppression of defect- related PL band (DPL), although at low NC loading the effect of these polymers is more different from each other than at high loading. Gelatine caused unexpectedly quenching of both PL excitonic (EPL) and DPL. The effect of PEDOT:PSS is relatively weak, as for conductive polymer, although distinct indications of structural and electronic changes in the polymer are found in Raman and XPS spectra

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Topics

Session A. Physics of condensed matter and spectroscopy

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