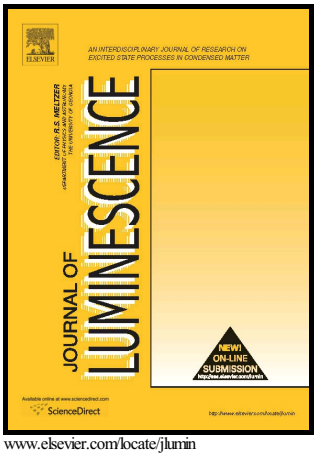

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Evidence of resonant energy transfer between CdSe/ZnS quantum dots and Neutral Red dye molecules

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Abstract

Förster resonant energy transfer (FRET) process can be monitored by observing the quenching of the donor luminescence in the presence of an acceptor particle. In a different way, the present study demonstrates such process in a pair system represented by CdSe/ZnS quantum dots (QDs) and Neutral Red dyes through a spatially resolved micro-photoluminescence (μ-PL) technique. The possibility of their use in biological applications can be explored, such as mimicking sensitive chemical-biological sensors. In order to obtain the signature of the nonradiative transfer FRET, the donor-acceptor intermolecular distance was changed by the acceptors concentration. A macroscopic point of view of the system was obtained by measures of the photon diffusion lengths as a function of the donor-acceptor distances. Both the QD donor fluorescence quenching and the fall of the spatial photon distribution with the acceptor concentration evidenced the FRET process. The results also confirmed that the chloroform solvent was clearly more appropriate for enhancing the FRET in the QD-NR system.

Keywords: energy transfer, quantum dot, micro-luminescence, FRET, CdSe/ZnS, neutral red, resonant energy transfer

Introduction

The FRET (Förster Resonance Energy Transfer) consists in a non-radiative mechanism in which an excited state donor, typically a fluorophore, transfers its energy to an acceptor in the ground state. FRET generally occurs near distances comparable with the dimensions of most biological macromolecules, which are about