Diploma thesis abstract.

Photoluminescence quenching of a conjugated polymer in solution via charge-transfer complex formation with low-molecular acceptor

In the current work, photoluminescence (PL) quenching of a conjugated polymer via formation of a ground-electron-state charge-transfer complex (CTC) with low-molecular acceptor in solution was investigated. Such blends seem to be perspective for usage in plastic solar cells as they have wide absorption spectra. To conduct the investigation, an analytical model of CP PL quenching was constructed.

The model is based on a solution of one-dimensional diffusion equation for a polymer chain containing several point quenchers (CTCs). Different variants of quencher distribution were investigated: equidistant location, random distribution, and cluster formation. Numerical modeling is in accordance with the analytical model.

The experimental part of the work includes MEH-PPV (soluble derivative of conjugated polymer poly(p-phenylene vinylene)) PL quenching data in the solution by low-molecular organic electron acceptor TNF (trinitrofluorenone). The measured PL quenching data were approximated by the model of random quenchers' distribution, and it was found that the model overestimates the quenching degree. A way for model improvement by accounting non-uniform quenchers' distribution is proposed.