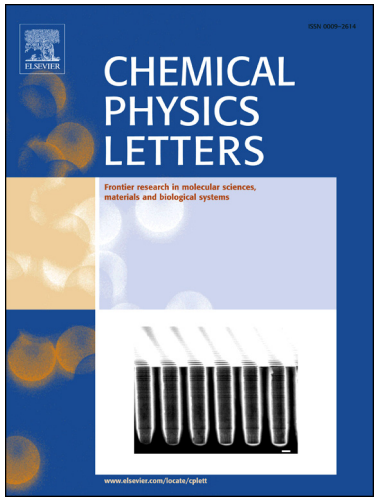

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Analysis of the phosphorescent dye concentration dependence of triplet-triplet annihilation in organic host-guest systems

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Abstract

Using a novel method for analyzing transient photoluminescence (PL) experiments, a microscopic description is obtained for the dye concentration dependence of triplet-triplet annihilation (TTA) in phosphorescent host-guest systems. It is demonstrated that the TTA-mechanism, which could be a single-step dominated process or a diffusion-mediated multi-step process, can be deduced for any given dye concentration from a recently proposed PL intensity analysis. A comparison with the results of kinetic Monte Carlo simulations provides the TTA-Förster radius and shows that the TTA enhancement due to triplet diffusion can be well described in a microscopic manner assuming Förster- or Dexter-type energy transfer.

Keywords:
triplet-triplet annihilation, transient photoluminescence, kinetic Monte-Carlo simulations, organic semiconducors, organic light-emitting diodes

1. Introduction

Triplet excitons play a crucial role in modern organic optoelectronic devices, such as organic light-emitting diodes (OLEDs) and organic photovoltaic

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