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Abstract | [References](#) | Full Text: [PDF](#) (264k) | [Related Articles](#) | [Citation Tracking](#)

Frenkel Exciton Model of Low Temperature Photoluminescence in α -PTCDA Single Crystals

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Abstract

Recent studies of the recombination dynamics in α -PTCDA (3, 4, 9, 10 perylene tetracarboxylic dianhydride) with time-resolved photoluminescence (PL) techniques in the 100 ns range have revealed six distinct PL contributions. In the present work, we demonstrate that the PL channel dominating at low temperature ($T = 11$ K) can be assigned to recombination from an indirect minimum of the dispersion of Frenkel excitons. The approach used is a straightforward extension of previous calculations applied to the linear optical properties of this prototypic molecular semiconductor.

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