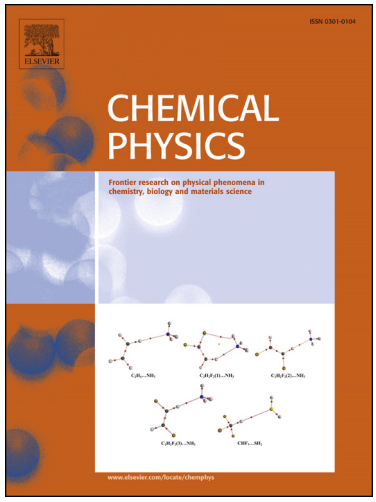

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R. Karpicz, S. Puzinas, V. Gulbinas, A. Vakhnin, A. Kadashchuk, B.P. Rand

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Exciton dynamics in an energy up-converting solid state system based on diphenylanthracene doped with platinum octaethylporphyrin

R. Karpicz[1], S. Puzinas[1], V. Gulbinas[1], A. Vakhnin[2], A. Kadashchuk[2,3], B. P. Rand[3,4]

[1]*Center for Physical Sciences and Technology, Savanoriu Ave. 231, LT-02300 Vilnius, Lithuania*

[2]*Institute of Physics, National Academy of Sciences of Ukraine, 03028 Kyiv, Ukraine*

[3]*IMEC, Kapeldreef 75, B-3001, Heverlee-Leuven, Belgium*

[4] *Department of Electrical Engineering and the Andlinger Center for Energy and the Environment, Princeton University, Princeton, NJ 08544 USA*

(Received)

Abstract.

Photophysics of composite solid films based on 9,10-diphenylanthracene (DPA) doped with Pt(II)octaethylporphyrin (PtOEP) has been investigated by means of transient absorption and luminescence spectroscopy. The DPA:PtOEP host:guest system is a benchmark for incoherent energy up-conversion via triplet fusion in solution and we focus here on photophysical processes of this system in solid films. The triplet energy transfer from PtOEP to DPA takes place during tens of ns, featuring a thermally activated behavior. This implies that, before being transferred to the host, triplets migrate within PtOEP aggregates, defining a rate limiting step for the overall energy transfer to DPA. In contrast to other porphyrin-based sensitizers, no significant triplet-triplet annihilation was found to happen during triplet migration within PtOEP aggregates, implying that such a triplet loss mechanism does not universally apply to porphyrine-based organometallic complexes.

Keywords

Incoherent photon upconversion; phosphorescence; energy transfer; triplet–triplet annihilation; host-guest system; platinum-octaethyl-porphyrin; ultrafast spectroscopy