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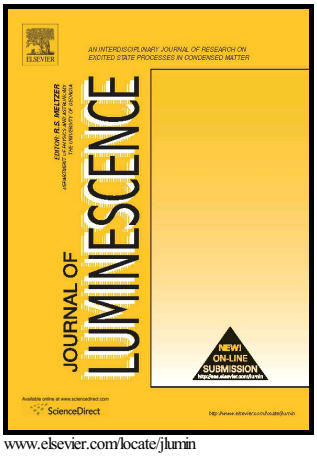

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Evidence of exciton dissociation into carriers induced by electric field in rubrene crystals

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Abstract

We investigated optical carrier injection mechanisms in an organic semiconductor rubrene crystals. We simultaneously measured exciton photoluminescence (PL) and photocurrent under an electric field higher than 1 kV/cm at room temperature. An anti-correlation between the exciton PL intensity and photocurrent was observed. This directly indicates that carriers are generated through an exciton dissociation induced by the electric field. The estimated exciton dissociation efficiency is on the order of 10^{-2} for an excitation wavelength of 442 nm under an electric field of 12 kV/cm at room temperature. In addition, we revealed that both carriers and excitons are trapped at oxidation sites at the surface area of the crystal and more efficiently emit a modified luminescence.

Keywords, rubrence, exciton dissociation, photocarrier

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