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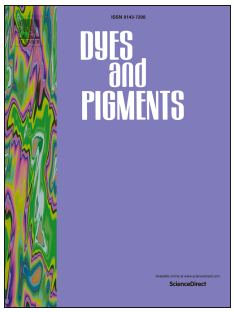

Pyrene derivatives as broadband nonlinear optical material: Magnitude and mechanism of transient refraction

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Pyrene derivatives as broadband nonlinear optical material: magnitude and mechanism of transient refraction

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Abstract

Two asymmetric pyrene derivatives (E)-1-(4-(dimethylamino)-3-(pyren-1-yl)prop-2-en-1-one) (**DAPP-1**) and (E)-3-(4-(diemthylamino)phenyl)-1-(pyren-1-yl)prop-2-en-1-one (**DAPP-2**) were synthesized to access lossless broadband nonlinear refraction. Femtoseconds Z-scan from 600 nm to 1030 nm showed positive third-order nonlinear refractive index with high linear transmission (> 90%). Both compounds had ≥2.5 figure of merit (F) at 1030 nm, while **DAPP-2** held >1 F value in a wide spectral region. Mechanism of ultrafast refraction under off & on-resonant regime were investigated via degenerate & non-degenerate pump-probe with phase object, respectively. Results indicate pure response of bound electrons under off-resonance and excited-state enhanced