HYPOCHROMISM IN TWO LOW ENERGY TRANSITIONS OF B_2 (B_{2u}) SYMMETRY IN THE ELECTRONIC SPECTRUM OF THE CARBAZOLE CRYSTAL

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The effect of intermolecular interactions on oscillator strengths of individual electronic transitions of B2 (B2u) symmetry in the carbazole crystal was studied. We have shown that the two lowest energy transitions of this symmetry exhibit very strong hypochromism - only 22% of the molecular oscillator strength is retained in the crystal spectrum. Polarized transmittance spectra of thin ($\approx 0.1\mu$) carbazole monocrystals were obtained in the near UV region at normal and oblique incidence of light on the sample. An expression for transmittance as a function of oscillator strengths of the B_2 (B_{2u}) symmetry electronic transitions in the crystal, and of the angle between the electric field vector of incident light and the respective transition dipoles was derived. The experimental oscillator strengths were obtained by fitting the measured transmittance spectra with the derived function. Local field theory was employed to calculate the theoretical values of the oscillator strengths of five individual electronic transitions in the carbazole crystal. The calculations are in agreement with the oscillator strengths sum rule. The theoretically predicted and experimentally obtained values of oscillator strengths of the two lowest B_2 (B_{2u}) symmetry transitions in the carbazole crystal are in very good agreement.

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