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Imidazopyridines derivatives: an evidence of excited state absorption contributing to the two-photon absorption

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Imidazo[4,5-b]pyridines is receiving quite attention due to the fact of they are isosteres of purine molecules, allowing a large range of biology applications . The advance of molecular engineering in the last years makes possible the easy production at low-cost of the molecular structure of interest with different peripherical groups added to its core, allowing to model its nonlinear optical response. This work presents a study about spectroscopic properties of six imidazo[4,5-b]pyridines derivatives with different electron-acceptor groups added to its backbone. Linear spectroscopy parameters such as molar absorptivity, fluorescence quantum yield, fluorescence lifetime, anisotropy coefficient, transition dipole moments and permanent dipole moment were determined thorugh linear spectroscopy techniques. The two-photon absorption cross section sepctrum was determined through the tunable femtosecond Z-Scan technique (1) and it was modeled by the phenomenological Sum-Over-States. The SOS approach depicted good agreement with the experimental results and show a strong dependence with the three-states term, i.e., the term which describes the absorption from the first electronic state to the second one. After, transient absorption measurements were employed to verify the excited state absorption and determine the fluorescence lifetime of the six imidazopyridines derivatives. The excited state absorption was verifyed in which could be the same electronic state of the two photon absorption one, indicating that such state is important to two photon absorption processes. In addition, molecules with two acception-electron groups added to the core of imidazopyridines presented higher two-photon absorption cross section, indicating a good route to increase the nonlinear absorption of such molecular structure.

Palavras-chave: Imidazopyridine derivatives. Two-photon absorption. Transient absorption.

Referências:

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