PICOSECOND PULSES FROM UV TO IR USING SPECTRO-TEMPORAL SELECTION DYE LASER

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Photophysical and photochemical properties of laser dyes (rhodamines and merocyanines) are studied through nanosecond and picosecond laser spectroscopy.

The polarity of the dye molecule is one of the most important parameters. In the case of merocyanines, the dye solubility, the red or blue shift of the ground state S_0 absorption spectrum respectively for the less or more polar dyes, the large red shift of the fluorescence spectrum in polar solvents depend strongly on the dye polarity in its S_0 ground state but also in its fluorescent first singlet excited state S_1 . Upon light excitation of DCM (4-dicyanomethylene-2-methyl-6-p-dimethylaminostyryl-4H-pyran) a large change of the dipole moment from 5.6 D to 26.3 D is evidenced due to an intramolecular electron transfer from the electron donor amino-group to the electron acceptor cyano-groups.

The absorption spectra of the transient excited singlets (nanosecond lifetime) and excited triplets (microsecond lifetime) and the quantum yield of intersystem crossing are also determined. The knowledge of these photophysical properties is essential to the dye lasers optimization.