BODIPY Based Fluorescent Molecular Rotors

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Molecular rotors are compounds, which molecules include two or more fragments that can rotate to each other. As a result of the energy absorption molecules form excited states, which could transform into a twisted state. Such intramolecular rotation leads to non-radiative deactivation of the excited state. Rotation ability is dependent on the viscosity of the used solvent. Because of high dependence the quantum yield on the viscosity the use of fluorescent molecular rotors as sensors of polymerization processes, aggregation and conformational changes in proteins, fluid flow probes and sensors of local-media viscosity in the cells of living organisms are actual and perspective. Boron dipyrrins (BODIPY) attracted the attention due to their high stability, intense chromophoric and fluorescent properties. BODIPY with bulky substituent could be the fluorescent molecular rotors. The purpose of work was to synthesize new BODIPY compounds, to study the possibility of their usage as fluorescent molecular rotors in liquid media. We determined the dependence of the fluorescence characteristics on the dynamic viscosity of the solvent, the influence of solvent nature on the spectral characteristics of the synthesized BODIPY with different nature of the substituent in the 8-position. The structure of the substituent in the 8-position influences the photophysical characteristics of the compounds; the viscosity of the solvent influences the intensity of the molecular rotor properties, so we proposed the optimal viscosity intervals of BODIPY usage as fluorescent molecular rotors; the nature of the solvent influence the photophysical characteristics, so specific interactions and solvent polarity should be taken into account in case of practical BODIPY applications.

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