Public Abstract

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Title:CCVJ's fluorescence lifetime as a viscosity measurement tool and its possible application as a tunable picoseconds reference lifetime standard

9-(2-carboxy-2-cyanovinyl) julolidine (CCVJ, a molecular rotor) was shown to perform as a viscosity sensitive probe. Using steady state spectroscopy, CCVJ was shown to have decreased emission intensity as the environmental viscosity decreased. The major disadvantage of this method is errors arising from concentration inaccuracies. A potential solution to this problem is to use time resolved spectroscopy to measure the fluorescence lifetime of CCVJ as a function of its environmentâ€™s viscosity (the measured fluorescent lifetime is independent of concentration). Time resolved studies revealed that CCVJ exhibits a single exponential decay which decreases with lower viscosity. A power law model that describes the fluorescence lifetime as a function of viscosity was obtained Y=0.02022*X^0.4988 where R^2=0.9932. It was also found that CCVJâ€™s characteristics make it a perfect candidate to be used as a tunable picoseconds fluorescence lifetime standard. Its fluorescence lifetime varies between 0.62-0.1 nanoseconds for viscosities between 945 -13.35 mPa*s, respectively and the single exponential decay is independent of excitation wavelength. CCVJ is commercially available and can be used without further purification. Four dyes of known lifetimes were successfully measured using CCVJ in 5 different viscosities as reference lifetime standards.