Transient Absorption Spectra of Some Naphthalimide Derivatives

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In this presentation transient absorption (**TA**) and steady state, as well as time-resolved fluorescence spectroscopy were used to investigate the mechanisms of fluorescence quenching in order to obtain new sensors for water detection in solutions of methanol, dimethylformamide (DMF) or dioxane.

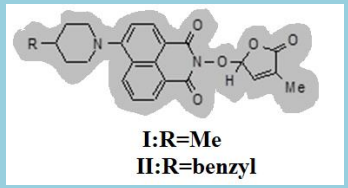

Figure 1. Naphthalimide derivatives

The new synthesized naphthalimide compounds present a good fluorescence, high quantum yield, stability and sensitivity.

We chose to approach the investigation of these naphthalimide derivatives for the theoretical information, and also some applications resulting from this study, as sensors. For fundamental study, the dynamic and static quenching theories as well as the combined dynamic and static method were applied.

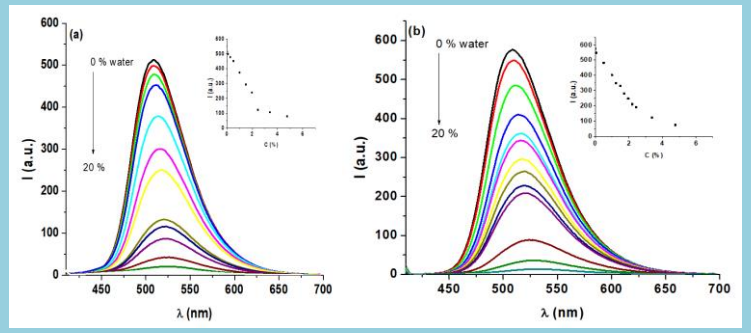

Figure 2. Emission spectra in dioxane upon gradual addition of different amounts of water water (λ_{ex} = 402 nm) (a) for **I** and (b) for **II**. Insets present the linear dependence of emission intensity versus water level

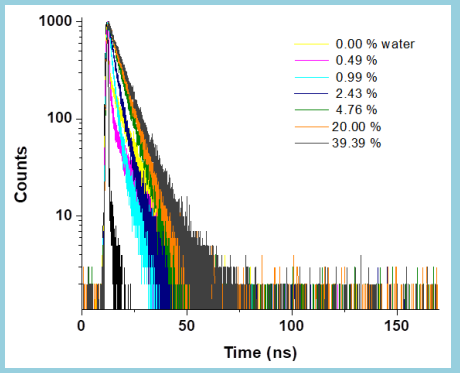

Figure 3. Fluorescence decay curves of **II** in dioxane with different amounts of water

Table 1. The emission lifetime in excited state, and the quantum yield

Solvent	I				II			
	τ_1 (ns)/a_1(%)	τ_2 (ns)/a_2(%)	Φ	τ_{av} (ns)	τ_1 (ns)/a_1(%)	τ_2 (ns)/a_2(%)	Φ	τ_{av} (ns)
Methanol	7.68(93.51)	0.56(6.49)	0.082	7.65	0.26(14.04)	7.29(85.96)	0.081	7.26
DMF	0.55(7.93)	8.76(92.07)	0.214	8.71	0.21(41.46)	7.75(58.54)	0.064	7.61
Dioxane	8.09(100)	-	0.821	8.09	8.05(100)	-	0.875	8.05

In the presence or absence of water, ground state bleaching bands (**GSB**) are present at shorter wavelengths in the **TA** maps. An absorption band in excited state (**ESA**) occurs at shorter wavelengths after 210 nm, and at longer wavelength, after 430 nm negative bands appeared, which can be assigned to the stimulated emissions (**SE**).

The obtained results suggest that these naphthalimide-based derivatives can act as potential sensors detecting low amounts of water.