

Supplementary materials

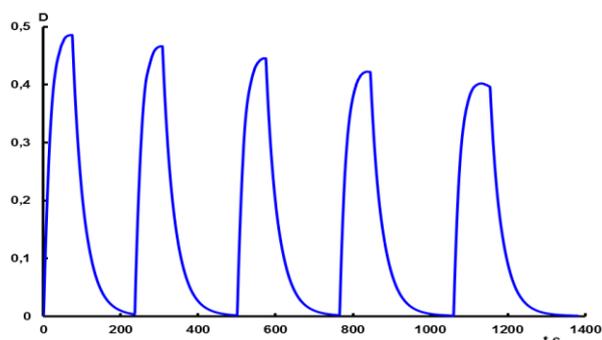


Figure S1. Kinetics of photo-coloring through a UFS-1 colored glass filter (235-400 nm) and dark relaxation of a solution of compound **2** in a mixture of toluene : acetonitrile solvents at the wavelength of 590 nm.

Table S1. Spectral characteristics of spiropyran **2** and its complexes with metal ions in mixed solvent with the ratio $C_L/C_{Me} = 1/100$

Ion	λ_A^{\max} , nm (D_A^{\max})	λ_B^{\max} , nm	ΔD_B^{phot}	$\pm\Delta\lambda_B$, nm
-	332 (0.49), 345 (0.44)	405sh, 590	0,48	-
Li ⁺	332 (0.49), 345 (0.44)	405 560	0,17	-30
Ca ²⁺	332 (0.49), 345 (0.44)	405sh 540	0,02 0,01	- -50
Zn ²⁺	332 (0.59), 345 (0.53)	405 545	0,03 <0.01	- -45
Mg ²⁺	332 (0.50), 345 (0.45)	405 535	0,02 <0,01	- -55

Note: λ_A^{\max} and λ_B^{\max} are the wavelengths of the maxima of the absorption bands of the initial and UV induced (in the visible spectra region) forms A and B, respectively; D_A^{\max} – the optical density in the maximum of absorption band of initial form A, ΔD_B^{phot} – change in the optical density in the maximum of absorption band located in the visible region of the spectrum of photoinduced form B; $\pm\Delta\lambda_B$ – shift of the absorption band maximum of the photoinduced form B of spiropyran in the presence of metal ions relative to the solution

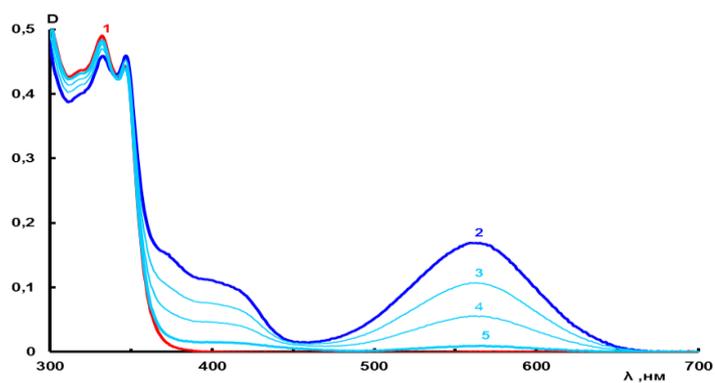


Figure S2. Absorption spectra of compound **2** in a mixture of toluene : acetonitrile solvents in the presence of Li^+ ions in a solution ($C_L/C_{\text{Me}} = 1/100$) before (1), after UV - irradiation and subsequent dark relaxation (3-5).

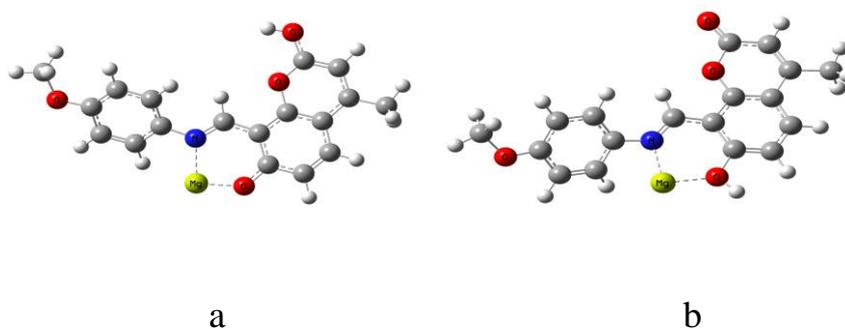


Figure S3 . Optimized models of tautomeric T (a) and E (b) forms of azomethinocoumarin complexes with Mg^{2+} ions.

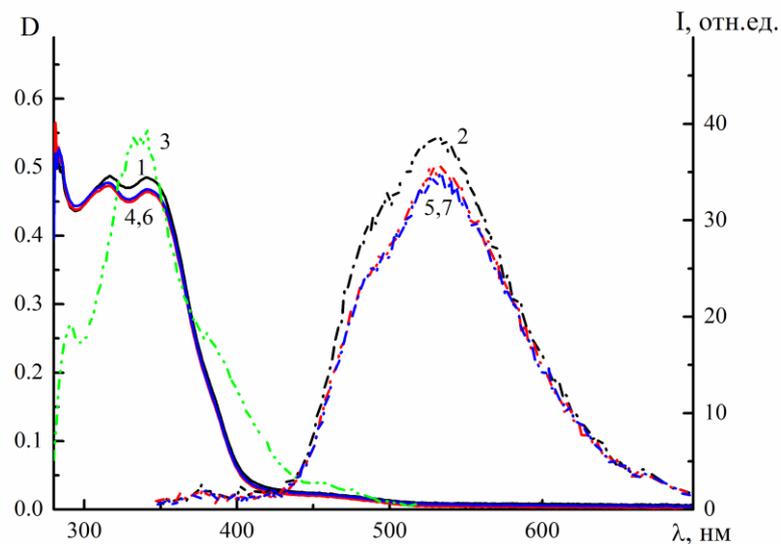


Figure S4. Absorption spectra (1, 4, 6), fluorescence excitation spectra at $\lambda_{reg} = 530$ nm (3) and fluorescence at $\lambda_{ex} = 338$ nm (2, 5, 7) of compound **3** with Zn^{2+} ions in a mixture of toluene-acetonitrile solvents before (1-3) and after irradiation by UV (4, 5) and visible light (6, 7).

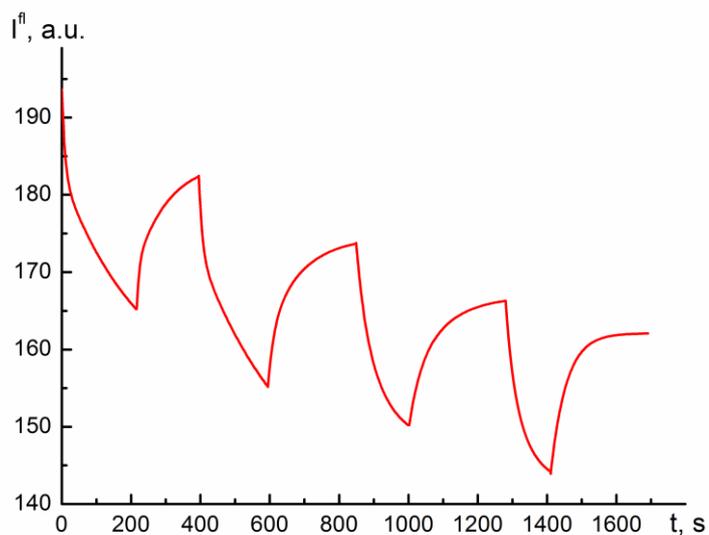


Figure S5. Kinetics of fluorescence changes for **1** in a toluene solution at a wavelength of 545 nm (at $\lambda_{ex} = 395$ nm) during alternating irradiation with UV (down) and visible (up) light from an external source of high intensity

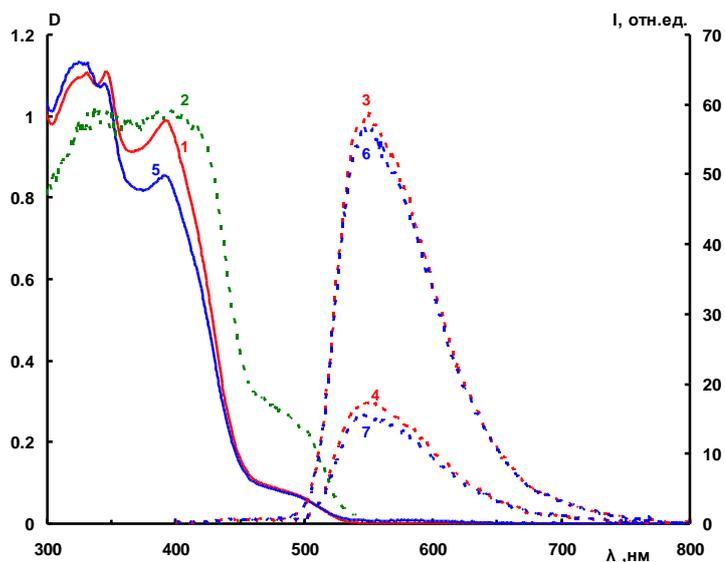


Figure S6. Absorption spectra (1,5), fluorescence excitation spectra at $\lambda_{\text{reg}} = 550 \text{ nm}$ (2) and fluorescence at $\lambda_{\text{ex}} = 390 \text{ nm}$ (3,6) and 490 nm (4, 7) before (1-4) and after UV irradiation (5-8) of compound **1** with Li^+ ions in the mixed toluene : acetonitrile solution

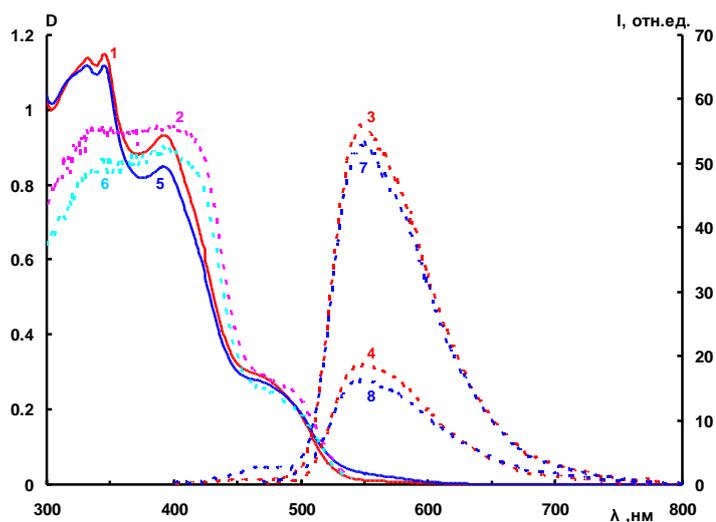


Figure S7. Absorption spectra (1,5), fluorescence excitation spectra at $\lambda_{\text{reg}} = 545 \text{ nm}$ (2, 6) and fluorescence at $\lambda_{\text{ex}} = 390 \text{ nm}$ (3, 7) and 460 nm (4, 8) before (1,4) and after UV- irradiation of compound **1** with Ca^{2+} ions in the mixed toluene : acetonitrile solution.

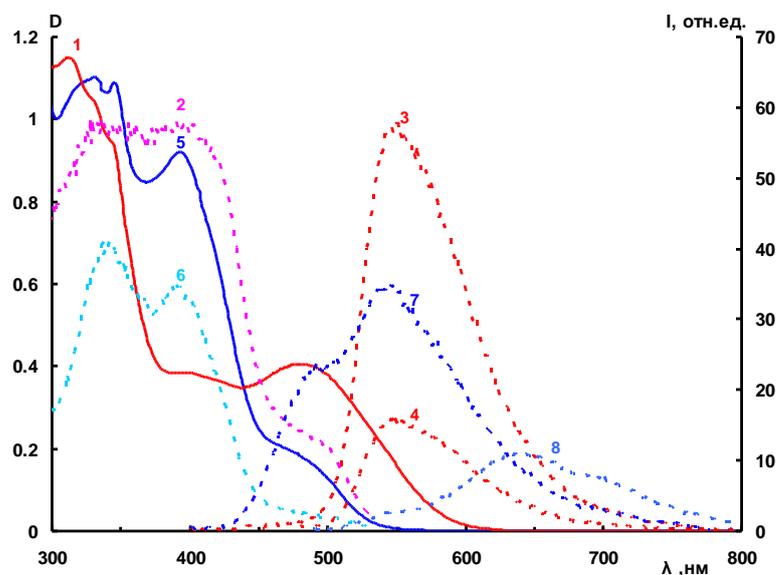


Figure S8. Absorption spectra (1,5), fluorescence excitation spectra at $\lambda_{\text{reg}}=545$ nm (2, 6) and fluorescence at $\lambda_{\text{ex}} = 390$ nm (3,7) and 480 nm (4,8) before (1-4) and after UV – irradiation compound **1** with Zn^{2+} ions in the mixed toluene : acetonitrile solution.

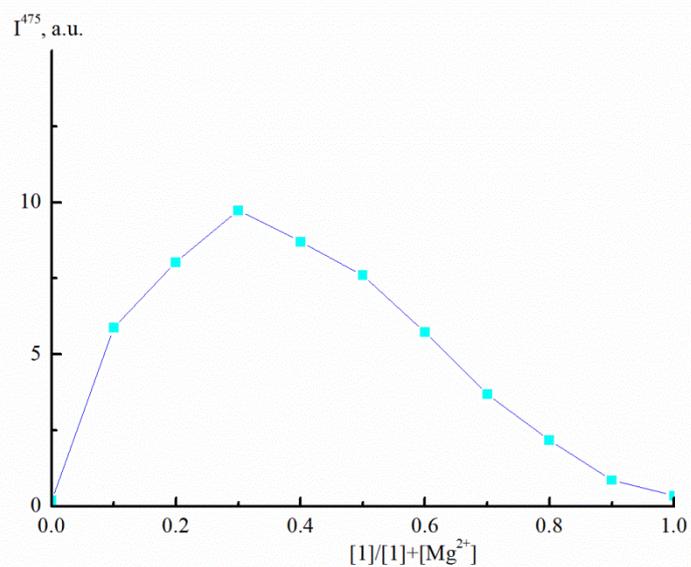


Figure S9. The changes in the fluorescence emission spectra at 475 nm of compound **1** at Mg^{2+} addition.