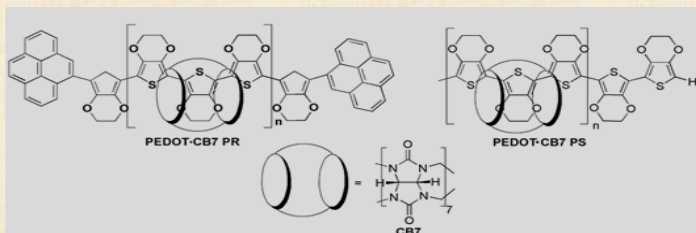


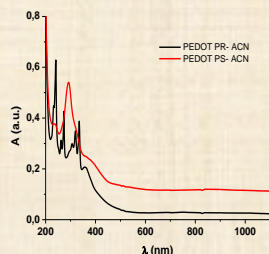
Photophysical studies of poly(3,4-ethylenedioxythiophene/cucurbit[7]uril) polypseudorotaxane and polyrotaxane by transient absorption and time-resolved fluorescence spectroscopy

Radu Ionut Tigoianu and Aurica Farcas

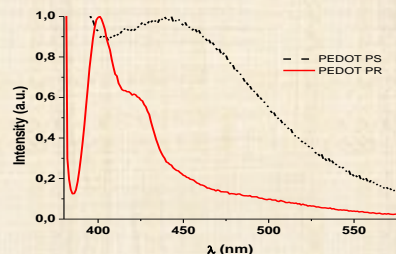
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The UV-Vis absorption, fluorescence and phosphorescence spectra of poly(3,4-ethylenedioxythiophene/cucurbit[7]uril) polypseudorotaxane (PEDOT-PS) and polyrotaxane (PEDOT-PR) in water and acetonitrile solutions were investigated.



Absorption spectra of PEDOT-PR/PS in ACN



Fluorescence spectra of PEDOT-PS ($\lambda_{ex}=300$ nm) and PEDOT-PR ($\lambda_{ex}=375$ nm) in H_2O

To achieve a deeper insight into the optical properties, the quantum yield with absolute values in the range 5-25 %, and phosphorescence lifetime with values in the range 1-9 μ s were evaluated.

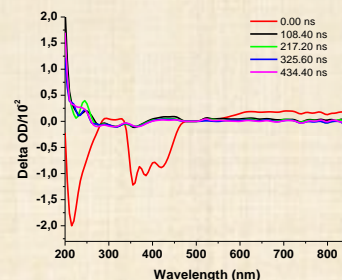
The quantum yields and lifetimes for PEDOT PR/PS

Compound	Solvents	λ_{ex} (nm)	λ_{em} (nm)	τ_1 (ns)	τ_2 (ns)	χ^2	Φ_{F1} (%)	Φ_{F2} (%)
PEDOT-PR	H_2O	375	422	5.49	-	0.99	-	-
PEDOT-PS	H_2O	375	443	0.57/54.41%	5.77/45.59%	1	-	-
PEDOT-PR	ACN	355	625	1124.48/72.76%	8921.85/27.24%	1	6.89	24.69
PEDOT-PS	ACN	355	710	1022.19/69.59%	8199.98/30.41%	1	5.36	15.81

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The transient absorption map in acetonitrile revealed at 210, 240, 300 and 315 nm a ground states bleaching bands (GSB), whereas at shorter wavelengths an absorption in excited states (ESA) and more than one excited state ($S_n > 1$). At 382 and 420 nm wavelength two negative bands appeared which were assigned to the stimulated emissions (SE). At longer wavelengths, *i.e.* 605, 625 and 710 nm, other stimulated emissions appeared that are probably a result of the triplet manifold, confirming their phosphorescence properties.



Transient absorption for PEDOT PR in ACN with $\lambda_{ex}=355$ nm

The transient absorption demonstrated an excited-state processes and involvement of high energy electronic states ($S_n > 1$).

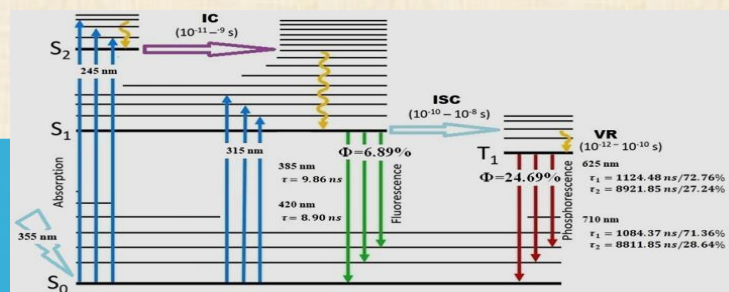


Diagram of energy level for PEDOT PR in ACN with $\lambda_{ex}=355$ nm

The transient absorption map revealed ground state bleaching bands (GSB), bands in excited state (ESA), negative bands appeared which can be assigned to the stimulated emissions (SE), and bands with phosphorescence properties.