

Photophysics Properties of Conjugated Alternating Copolymer (TPA-PAnV) and its Model Compound(TPA –AnV-TPA)

Bai Fenglian Zheng Min, Lin Ton, Zhu Daoben

Institute of Chemistry, Laboratory of Organic Solids. The Chinese Academy of Sciences, Beijing 10080, China

A new light emitting alternating copolymer with hole transport triphenylamine and conjugated Anthrylene unit (TPA-PAnV) and its model compound-triad (TPA-AnV-TPA) has been designed and synthesized (1-2). The photophysics properties were studied and the results show that the charge transfer complexes between TPA and Anthrylene chromophores in copolymer and model compound are formed.

The absorption spectra of TPA-PAnV and TPA-AnV-TPA are broad and have the long tails, which maybe indicated the formation of the charge transfer complexes. The formation of CT complex can be confirmed from the emission spectra of TPA-PAnV and TPA-AnV-TPA also. The fluorescence temperature effect and the solvent effect of TPA-PAnV and the triad were measured. The lifetimes of the emission were investigated. The decay times monitored at different emission wavelengths show 2-exponential function. The emission spectra getting at different excitation wavelengths are different.

In TPA-AnV-TPA solution the TICT band were observed when the excitation wavelength selected at short wavelength (<360nm) which is corresponding to the absorption band of triphenylamine. A linear function of the peak positions of TPA-AnV-TPA with the polarity parameter $E_T(30)$ of solvents was obtained

The fluorescence spectra of TPA-PAnV and TPA-AnV-TPA solution quenched by C_{60} were examined and the results indicated that the strong interactions exist between both copolymer and triad and C_{60} at excited state (3). This interaction may be caused by the photoinduced charge transfer and $\pi - \pi$ conjugated interaction.

To gain an insight into the conformation of triad TPA-AnV-TPA, quantum mechanical calculation were performed by AM1 method. Molecule dynamics simulation was performed in order to reach the conformation with the minimal energy. The conformation of triad is in twisted structure.

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References

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