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Influence of Alkoxy Tail Length on the Properties of Side Chain

Liquid Crystal Polymers with Aggregation-Induced Emission

Enhancement Characteristics

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Abstract

In this paper, a series of side chain liquid crystal polymers (SCLCPs) containing cyanostilbene cores, alkoxy tail namely poly[(Z)-6-(4-(1-cyano-2-(4-(alkoxy)phenyl)vinyl)phenoxy)hexyl methacrylate]s (abbreviated as PM6PVPCm, m is the alkoxy tail length) were synthesized and the effects of the alkoxy tail length on the properties of the SCLCPs were explored. The structures and properties of the SCLCPs were measured by ^1H nuclear magnetic resonance ($^1\text{HNMR}$), thermogravimetric analysis (TGA), polarized optical microscopy (POM), differential scanning calorimetry (DSC), X-ray diffraction (XRD), ultraviolet spectroscopy (UV) and photoluminescence (PL) measurements. Experimental results showed that all polymers enjoyed excellent thermo-stability, with 5% weight percentage loss temperatures up to 340°C. All polymers also exhibited stable smectic liquid crystallinity and the alkoxy tail length also had a great impact on the mesophase behavior. The clearing point (T_i) showed an increasing trend with increase of the alkoxy tail length. All polymers showed weak emission in dilute solutions while emitted stronger fluorescence when aggregated in non-solvent or in the solid state, displaying an interesting characteristic of aggregation-induced emission enhancement (AIEE). The luminescent properties of polymers are sensitive to alkoxy tail length and their solid-state fluorescence quantum yield increased with

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