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# 含呔雙唑之新穎材料於液晶與高分子發光二極體之應用


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## 摘要



一系列包含呔雙唑(oxadiazole)雜環的液晶材料被合成與鑑定，這些液晶分子有穩定的向列相和層列 A 相，其相轉移溫度、液晶相與光學性質皆受到末端基官能性的影響。大體而言，當末端基的極性增強，液晶相的溫度範圍也變的較廣。當 OXD 基團懸掛於聚萘高分子上時，高分子之熱性質與液晶相都受到 OXD 懸掛基團明顯的影響，其玻璃態的液晶性質相較於聚萘高分子具有更為寬廣的液晶相溫度範圍與較低的相轉移溫度，此外當 OXD 基團導入聚萘高分子，將可有效的抑制結晶與高分子鏈聚集的現象。當作成元件時，其光電特性優於聚萘高分子。另外一方，我們本研究中也合成一系列萘和 OXD 基團成十字共軛的發光高分子，此系列高分子的物理性質和電化學性質皆受懸掛末端基的極性與尺寸大小影響，當不對稱 OXD 基團接在高分子鏈上時，其螢光效率較高，且有較佳的抑制分子鏈聚集的效果。

# **Novel Materials Containing 1,3,4-Oxadiazole Moieties for Applications of Liquid Crystals and Polymer Light-Emitting Diodes**

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A series of 1,3,4-oxadiazole (OXD)-containing liquid crystals are synthesized and characterized. These molecular oxadiazole-based liquid crystals exhibit stable mesogenic properties including the nematic and smectic A phases. With the analogous structural design, the transition temperatures, mesomorphic phases, optical properties, and internal quantum efficiencies show strong dependence on the terminal substitution. In general, by increasing the terminal dipoles the temperature ranges of the mesophases are improved. Furthermore, poly(fluorene)-based copolymers with OXD pendants exhibit glass-forming liquid crystalline properties and reveal much wider mesophasic temperature ranges than that of poly(fluorene) (PF). The thermal properties and mesomorphism of these conjugated polymers are mainly affected by the nature of these pendants. In addition, the tendencies of crystallization and aggregation of PF are also suppressed by introducing the OXD pendants. In the other hand, we report a series of cross conjugated fluorene-based copolymers

containing symmetrical and asymmetrical substituted OXD pendants with different terminal groups (on the side chains of the polymers). The physical and electrochemical properties of these polymers are affected by the polar effect such as electron-withdrawing group, -CN, and electron-donating group, -R or -OR and the size effect (including the size of the grafted side chain) of the OXD pendants.



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