

研究论文

含噻吩单元的硅芴共聚物的合成及其蓝色电致发光性能

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收稿日期 2007-1-24 修回日期 网络版发布日期 2007-8-10 接受日期

摘要 将少量(摩尔分数为1%—3%)含噻吩的窄带隙单体和宽带隙硅芴单体进行共聚, 合成了聚{9,9-二己基-3,6-硅芴-co-[2,5-二(2-甲基苯撑-4-基)-噻吩]}和聚{9,9-二己基-3,6-硅芴-co-[2,5-二(2-苯撑-4-基)-噻吩]}两类硅芴共聚物, 通过紫外-可见吸收光谱、光致发光光谱, 并制作聚合物发光二极管器件测试电致发光光谱等手段, 系统表征了两类硅芴共聚物材料的性能. 实验结果表明, 噻吩的加入形成了新的蓝色发光中心, 并且实现了从硅芴链段到含噻吩发光中心的有效能量转移. 通过增加发光中心结构的位阻来减小其共轭程度, 可以使聚合物的PL和EL光谱发生较大蓝移. 最终得到了效率为0.46%和色坐标(CIE)为(0.19, 0.16)的蓝光LED器件.

关键词 [聚合物发光二极管](#) [芴](#) [聚硅芴](#) [噻吩](#) [蓝光聚合物](#) [电致发光](#)

分类号 [0631](#)

Synthesis and Blue Electroluminescent Properties of Copolymers Derived from Silafluorene and Thiophene

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Abstract Two series of silafluorene based copolymers containing a small molar fraction(1%—3%) of thiophene derivatives moieties were synthesized with Yamamoto coupling reaction: poly{9,9-dihexyl-3,6-silafluorene-co-[2,5-di(phenylene-4-yl)-thiophene]} (PSiF-DPT) and poly{9,9-dihexyl-3,6-silafluorene-co-[2,5-di((2-methylphenylene)-4-yl)-thiophene]} (PSiF-DMPT). These copolymers were characterized via UV-Vis absorption spectra and photoluminescence spectra. Polymer light-emitting diodes(PLED) were fabricated to investigate these electroluminescent properties. It was found that the thiophene derivatives moieties became the efficient blue emitter via efficient energy transfer from the polysilafluorene segments. With the decrease of the coplanarity of thiophene derivatives or its feed ratio, the PL and EL spectra can be blue shifted. The color purity can be adjusted to CIE(0.19,0.16) with a EL quantum efficiency of 0.46%.

Key words [Polymer light-emitting diode](#) [Polysilafluorene](#) [Thiophene](#) [Blue light-emitting polymer](#) [Electroluminescence](#)

DOI:

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