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研究论文

PVK与新型D-π-A分子掺杂体系的能量转移及发光性质

赵昳昕, 彭平, 周印华, 吴伟才, 田文晶

吉林大学超分子结构与材料教育部重点实验室, 长春 130012

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摘要 通过对PVK与4种新型D-π-A分子(分别简写为CKD, TKD, PKD, NKD)掺杂体系的吸收光谱、激发光谱和光致发光光谱的研究, 分析了掺杂体系的光致发光特性和能量转移现象. 制备了结构为ITO/PEDOT/PVK:D-π-A ω/Alq_3/Al的电致发光器件, 研究了掺杂体系的电致发光性能. 研究结果表明, 通过改变D-π-A分子中不同给电子能力的电子给体, 可以调控其带隙, 进而实现对D-π-A分子发光峰位的调节; 给电子基团空间立构效应越高, 其荧光量子效率越高. 在掺杂体系的光致发光和电致发光中, PVK与D-π-A分子之间都发生了有效的能量转移, 通过调节PVK与D-π-A分子的比例, 可以调节掺杂体系的发光性能. 当TKD在PVK中的掺杂质量分数为6%时, 电致发光器件发光亮度为729.1 cd/m^2时, 发光效率达到1.75 cd/A.

关键词 D-π-A分子 PVK:D-π-A掺杂体系 光致发光 能量转移 电致发光

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Energy Transfer and Luminescent Properties in PVK and Novel Donor-acceptor Molecular Materials Blend System

ZHAO Yi-Xin, PENG Ping, ZHOU Yin-Hua, WU Wei-Cai, TIAN Wen-Jing*

Key Laboratory for Supramolecular Structure and Materials of Ministry of Education, Jilin University, Changchun 130012, China

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Abstract The energy transfer and the luminescent properties of PVK and four novel donor-π-acceptor(D-π-A) molecules(CKD, TKD, PKD, NKD) doped systems were investigated with the analysis of UV-Vis absorption spectra, photoluminescent excitation(PLE) spectra and photoluminescent(PL)spectra.The electroluminescence(EL) properties of the blend system were studied *via* the characterization of the devices ITO/PEDOT/PVK:D-π-A ω/Alq_3/Al. The results demonstrate that by changing the donor moieties of D-π-A molecule, the band gap of D-π-A molecules can be adjusted. Meanwhile the fluorescence quantum efficiency varies significantly with the stereostructure of donor moieties of D-π-A molecules. Both the PL and EL spectra show that the energy transfer between PVK and D-π-A molecules occurs effectively. The emission performance of the blend system could be improved with changing the dopant ratio of PVK and D-π-A molecules. The power efficiency of the device is up to 1.75 cd/A at 729.1 cd/m^2, when the dopant mass fraction between PVK and TKD is 6.0%.

Key words Donor-acceptor molecular; PVK:D-π-A blend system; Photoluminescence; Energy transfer; Electroluminescence

通讯作者:
田文晶 wjtian@mail.jlu.edu.cn
作者个人主页: 赵昳昕; 彭平; 周印华; 吴伟才; 田文晶