

研究论文

共价嫁接Ru(II)配合物杂化材料的制备及氧气传感性能研究

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摘要 利用十六烷基三甲基溴化铵制备了一种具有MSU型蠕虫状孔道结构, 同时共价嫁接了Ru(II)配合物的介孔杂化功能材料, 并研究了其氧气传感性能. 双功能有机改性硅酸酯Bpy-Si不仅是配合物Ru(bpy)₂Cl₂·2H₂O的一个配体, 而且通过与正硅酸乙酯的水解和共聚反应, 把Ru(bpy)₂(bpy-Si)Cl₂配合物通过Si—C共价键嫁接到二氧化硅的骨架上. 研究表明, Ru(II)分子在杂化材料中的发光受氧气猝灭明显, 而且具有较快的响应时间, 所得材料具有作为性能优良的氧气传感材料研究的潜质. 由于介孔材料的独特孔道结构有利于氧气在载体中的扩散, 介孔样品表现出比无定形样品更高的灵敏度.

关键词 [钌配合物](#) [共价嫁接](#) [氧气传感器](#) [介孔分子筛](#)

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Preparation and Oxygen Sensing Properties of Hybrid Materials Based on a Covalently Grafted Ruthenium(II) Complex

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Abstract

The preparation and oxygen sensing properties of mesoporous materials DWM with a structure similar to that of MSU-type mesoporous materials based on covalently grafted Ru(bpy)₂²⁺ fragments through the Si—CH₂ covalent bonds were described in this paper. The 2,2'-bipyridyl covalently grafted to 3-aminopropyltriethoxysilane was used as one of the sol-gel precursor and the ligand of Ru(bpy)₂Cl₂·2H₂O complex to prepare the sol-gel derived silicates. The luminescence of the covalently grafted Ru(II) luminophore within the mesoporous matrix can be extremely quenched by oxygen with a good sensitivity and rapid response time, which suggests that the covalently grafting strategy presented in this paper can be used to develop superior oxygen sensor. In addition, the mesoporous structure possesses a higher sensitivity than that of the amorphous one due to the inner porous channels of the mesoporous matrix favor the

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diffusion of oxygen, resulting in the higher sensitivity and shorter response time. Furthermore, the covalently grafting method possesses the distinct advantages over those physically entrapped methods due to the Si—CH₂ covalent bond, which greatly minimized the dye leaching effect and ensure the good stability.

Key words [Ruthenium complex](#) [Covalently grafting](#) [Oxygen sensor](#) [Mesostructured molecular sieves](#)

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