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## 论文

SiO<sub>2</sub>纳米颗粒对R6G-乙醇溶液荧光光谱影响杨爱玲<sup>a</sup>,赵维娜<sup>b</sup>,杨云<sup>a</sup>,姚超<sup>a</sup>

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## 摘要:

在 $3 \times 10^{-4}$ M和 $1 \times 10^{-4}$ M浓度的R6G-乙醇溶液中分别掺杂了8个不同浓度的SiO<sub>2</sub>纳米颗粒(107~1012个/mL).研究了SiO<sub>2</sub>纳米颗粒(100 nm)对若丹明6G(R6G)荧光光谱的影响,结果表明:n1~n4(1012~1010个/mL)浓度掺杂的SiO<sub>2</sub>纳米颗粒在549 nm处的有很好的荧光增强作用,对570 nm处的荧光峰有明显的猝灭作用;n5~n8(109~107个/mL)浓度掺杂的SiO<sub>2</sub>纳米颗粒在549 nm处没有明显的荧光增强作用,但对570 nm处的荧光峰有增强作用,荧光增强因子可达10%~20%.荧光增强与猝灭的原因在于纳米颗粒对荧光的散射作用和R6G无荧光H-型二聚体或荧光J-型二聚体的形成.

**关键词:** 若丹明6G-乙醇溶液 SiO<sub>2</sub>纳米颗粒 荧光光谱 二聚体

Influence of SiO<sub>2</sub> Nanoparticles to Fluorescence Spectra of Ethanol-Rhodamine 6G SolutionsYANG Ai-ling<sup>a</sup>,ZHAO Wei-na<sup>b</sup>,YANG Yun<sup>a</sup>,YAO Chao<sup>a</sup>

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## Abstract:

SiO<sub>2</sub> nanoparticles with eight different concentrations were doped in the Rhodamine 6G-ethanol solutions( $3 \times 10^{-4}$  M and  $1 \times 10^{-4}$  M).The influence of SiO<sub>2</sub> nanoparticles to the fluorescence spectra of R6G-ethanol solutions were investigated.The results shows:1)when the concentrations of SiO<sub>2</sub> within in the range of n1~n4(1012~1010/mL),the fluorescence spectra at 549 nm were well enhanced,but the fluorescence peaks at 570 nm was obviously quenched and the peaks have a red shift|2) when the concentrations of SiO<sub>2</sub> within in the range of n5~n8(109~107/mL),the fluorescence spectra at 549 nm were not enhanced significantly,but the fluorescence peaks at 570 nm was obviously enhanced,the enhancement factors can get to 10%~20%,and the peaks do not have a red shift.The reasons of the fluorescence enhancing or quenching are relative to the scattering of the nanoparticles to the luminescence and the non-fluorescent H-dimers or fluorescent J-dimers of R6G moleculars.

**Keywords:** Rhodamine 6G-ethanol solutions SiO<sub>2</sub> nanoparticles Fluorescence spectra Dimers

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## 参考文献:

- [1]FISCHER M,GEORGES J.Fluorescence quantum yield of rhodamine 6G in ethanol as a function of concentration using thermal lens spectrometry[J].Chemical Physics Letters,1996,260(1-2):115-118.
- [2]HUNG J,CASTILLO J,MARCANO OLAIZOLA A.Fluorescence spectra of Rhodamine 6G for high fluence excitation laser radiation[J].Journal of Luminescence,2003,101(4):263-268.
- [3]TOU T Y,YAP S S,CHIN O H,et al.Optimization of a Rhodamine 6G-doped PMMA thin-slab laser[J].Optical Materials,2007,29(8):963-969.
- [4]LIU Bao-sheng,LIU Zhi-chao,CAO Zhao-zhen.Fluorescence resonance energy transfer between acridine orange and rhodamine 6G and analytical application in micelles of dodecyl benzene sodium sulfonate[J].Journal of Luminescence,2006,118(1):99-105.
- [5]XU Hao,LI Ying,LIU Chun-mei,et al.Fluorescence resonance energy transfer between acridine orange and rhodamine 6G and its analytical application for vitamin B12 with flow-injection laser-induced fluorescence detection[J].Talanta,2008,77(1):176-181.
- [6]JIE Nian-qin,ZHANG Qiang,YANG Jing-he,et al.Determination of chromium in waste-water and cast iron samples by fluorescence quenching of rhodamine 6G[J].Talanta,1998,46(1):215-219.
- [7]MISRA V,MISRA H,JOSHI H C,et al.Excitation energy transfer between acriflavine and rhodamine 6G as a pH sensor[J].Sensors and Actuators B,2000,63(1-2):18-23.
- [8]CHEN Jin-long,ZHENG Ai-fang,CHEN Ai-hong et al.A functionalized gold nanoparticles and Rhodamine 6G based fluorescent sensor for high sensitive and selective detection of mercury(II) in environmental water samples[J].Analytica Chimica Acta,2007,599(1):134-142.
- [9]SANTHI A,UMADEVI M,RAMAKRISHNAN V,et al.Effect of silver nano-particles on the fluorescence quantum yield of Rhodamine 6G determined using dual beam thermal lens method[J].Spectrochimica Acta Part A,2004,60(5):1077-1083.
- [10]CHOWDHURY P S,SEN P,PATRA A.Optical properties of CdS nanoparticles and the energy transfer from CdS nanoparticles to Rhodamine 6G[J].Chemical Physics Letters,2005,413(4-6):311-314.
- [11]ZHU Jian,ZHU Ke,HUANG Li-qing.Using gold colloid nanoparticles to modulate the surface enhanced fluorescence of Rhodamine B[J].Physics Letters A,2008,372(18):3283-3288.
- [12]VOGEL R,MEREDITH P,HARVEY M D,et al.Absorption and fluorescence spectroscopy of rhodamine 6G in titanium dioxide nanocomposites[J].Spectrochimica Acta Part A,2004,60(1-2):245-249.
- [13]RAO A P,RAO A V.Studies on the effect of organic additives on the monolithicity and optical properties of the rhodamine 6G doped silica xerggels[J].Materials Letters,2003,57(24-25):3741-3747.
- [14]COSTA T M H,HOFFMANN H S,BENVENUTTI E V,et al.Pressure-induced changes on the optical properties and microstructure of silica-gel matrices doped with rhodamine 6G[J].Optical Materials,2005,27(12):1819-1824.
- [15]CARBONARO C M,MARCEDDU M,RICCI P C,et al.Photostability of porous silica-rhodamine 6G hybrid samples[J].Materials Science and Engineering:C,2006,26(5-7):1038-1043.
- [16]LARANJO M T,STEFANI V,BENVENUTTI E V,et al.Synthesis of ORMOSIL silica/rhodamine 6G:Powders and compacts[J].Journal of Non-Crystalline Solids,2007,353(1):24-30.
- [17]HSU C Y,LIU Y L.Rhodamine B-anchored silica nanoparticles displaying white-light photoluminescence and their uses in preparations of photoluminescent polymeric films and nanofibers[J].Journal of Colloid and Interface Science,2010,350(1):75-82.

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4. 贾艳华;徐晓轩;杨仁杰;梁骏;周新勇;张存洲.煎炸食用油质量变化的同步荧光光谱研究[J]. 光子学报, 2006,35(11): 1717-1720
5. 李荣青;刘莹;葛立新;高淑梅 .激光诱导荧光光谱法研究血细胞衰变规律[J]. 光子学报, 2006,35(3): 398-401
6. 廖小华,王颖,陈荣,顾瑛,王月云,曾海山.光谱技术检测鲜红斑痣病变程度的MC模拟[J]. 光子学报, 2009,38(5): 1254-1258
7. 侯瑶;杨一心;王艳;于云龙;张亮;杨挺.硝酸咪唑唑的OPO激光激发光谱[J]. 光子学报, 2004,33(1): 126-128
8. 赵圣之;陈磊;张路;张福军;Alexandra Rapaport;Michael Bass.Nd:YAG晶体1.064  $\mu\text{m}$ 受激发射截面随温度变化特性研究[J]. 光子学报, 2004,33(2): 133-135
9. 王琳,庞其昌,马骥,赵静,胡翠英,李子雷,李启湛,崔代军.一种中药荧光指纹图谱的光谱图像构建方法[J]. 光子学报, 2011,40(6): 860-864
10. 王艳;杨一心;赵天成;于云龙;杨刚;侯瑶.氯化稀土( $\text{Eu}^{3+}$ , $\text{Tb}^{3+}$ )乙酰丙氨酸咪唑的FTIR光谱和激光激发光谱[J]. 光子学报, 2004,33(2): 192-194
11. 彭菊芳;王水才;贺俊芳;蔡霞;刘晓;匡廷云.捕光天线LHC II 的荧光光谱特性研究[J]. 光子学报, 2004,33(1): 65-68
12. 程成,林彦国,严金华.以UV胶为纤芯本底的CdSe/ZnS量子点光纤光致荧光光谱的传光特性[J]. 光子学报, 2011,40(6): 888-893
13. 刘晓;王水才;贺俊芳;蔡霞;彭菊芳;匡廷云.PS II 颗粒复合物飞秒分辨低温荧光动力学研究[J]. 光子学报, 2004,33(2): 216-220
14. 李玮楠;邹快盛;沈华;陆敏;相里斌.EDWA用基础玻璃的光谱特性研究[J]. 光子学报, 2004,33(6): 693-696
15. 彭菊芳;王水才;贺俊芳;蔡霞;刘晓;匡廷云.捕光复合物LHC II 的荧光动力学特性[J]. 光子学报, 2004,33(2): 212-215

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