化学学报 2006 64 (20): 2127～2131 ISSN: 0567-7351 CN: 31-1320/06

研究简报

Tb(III)与PNIPAM接枝核壳纳米微球相互作用的研究

殷伟庆[1,2], 陈明清[1], 陆天虹[2,3], MITSURU, Akashi[4], 黄晓华*,[1,2]

([1]江南大学化学与材料工程学院 无锡 214036)
([2]南京师范大学化学与环境科学学院 材料科学重点实验室 南京 210097)
([3]中国科学院长春应用化学研究所 长春 130022)
([4]大阪大学工学部分子化学系 日本吹田市 565－0871)

收稿日期 2006-2-21 修回日期 2006-5-14 网络版发布日期 2006-10-27 接受日期 2006-1-27

摘要 利用透射电镜、X射线光电子能谱、动态激光光散射和荧光光谱技术对Tb(III)与聚*N*-异丙基丙烯酰胺(PNIPAM)接枝核壳纳米微球PNIPAM-g-P(NIPAM-*co*-St) (PNNS)的相互作用进行了研究. 结果表明: Tb(III)和热敏性的核壳纳米微球PNNS有显著的相互作用. 其一, Tb(III)可与PNNS中酰胺基团上的氧原子配位形成微球配合物Tb(III)-PNNS; 其二, Tb(III)-PNNS微球配合物兼具热敏性; 其三, 该配合物在545 nm处的荧光强度较Tb(III)增大了233倍, Tb(III)与PNNS分子间能量传递达到50%, 当Tb(III)质量分数为12%时荧光强度最大.

关键词 聚*N*-异丙基丙烯酰胺 Tb(III) 低临界溶解温度 XPS 能量传递

分类号

Study on the Interaction between Tb(III) and PNIPAM Grafted Core-Shell Nanoparticles

YIN Wei-Qing[1,2], CHEN Ming-Qing [1], LU Tian-Hong[2,3], MITSURU Akashi[4], HUANG Xiao-Hua*,[1,2]

([1] *School of Chemistry and Materials, Southern Yangtze University, Wuxi 214036*)
([2] *College of Chemistry and Environmental Science, Nanjing Normal Univer-sity, Nanjing 210097*)
([3] *Changchun Institute of Applied Chemistry, Chinese Acad-emy of Sciences, Changchun 130022*)
([4] *Department of Applied Chemistry, Graduate School Engineering, Osaka University, Suita 565-0871, Japan*)

Abstract The interaction between poly(*N*-isopropylacrylamide) PNIPAM grafted core-shell nano particles PNIPAM-g-P(NIPAM-*co*-St) (PNNS) and Tb(III) core-shell nanoparticles was characterized by transmission electron microscopy (TEM), X-ray photoelectron spectroscopy (XPS), dynamic light scattering (DLS) and fluorescence spectroscopy. It was found that there is a strong interaction between Tb(III) and PNNS core-shell nanoparticles. Firstly, Tb(III) mainly bonded to atom O of the carbonyl groups of PNNS to form the complex of Tb(III)-PNNS. Secondly, the Tb(III)-PNNS complex had the temperature responsive property. Thirdly, the maximum emission intensity of the complex at 545 nm was enhanced about 223 times compared to that of the pure Tb(III). The intramolecular energy transfer efficiency from PNNS to Tb(III) reached 50%. When the mass fraction of Tb(III) was 12%, the enhancement of the emission fluorescence intensity at 545 nm was the highest.

Key words poly(*N*-isopropylacrylamide) terbium lower critical solution temperature XPS energy transfer

DOI:

通讯作者 黄晓华 wxxhhuang@yahoo.com