

## 论文

### 单分散P(St-BA-AN)/PANI核壳结构复合微球的制备与电性能

闫建红<sup>1</sup>, 黄俐研<sup>1</sup>, 刘正平<sup>2</sup>, 张军刚<sup>1</sup>, 侯文博<sup>1</sup>

1. 北京师范大学化学学院,
2. 环境友好与功能高分子材料重点实验室, 北京 100875

#### 摘要:

以苯乙烯(St)、丙烯酸丁酯(BA)和丙烯腈(AN)为单体, 采用乳液聚合的方法制备出单分散苯乙烯-丙烯酸丁酯-丙烯腈三元共聚物[P(St-BA-AN)]种子微球, 再在该种子微球表面包覆聚苯胺(PANI), 制得P(St-BA-AN)/PANI核壳结构复合微球. 采用扫描电镜(SEM)、透射电镜(TEM)、傅里叶变换红外透射光谱(FTIR)和漫反射光谱等测试手段对所制备的种子微球和复合微球的形态、结构和形成机理进行了研究, 并用四探针法测定了核壳结构复合物的导电性. 研究表明, 通过改变种子乳液共聚物的组成和加入苯胺的量及氧化剂的量等条件可调控复合微球的电导率. 与P(St-BA)/PANI核壳结构复合微球相比, 在核组成中引入了氰基的P(St-BA-AN)/PANI核壳结构复合微球的电导率明显提高, 当加入苯胺的量为P(St-BA-AN)种子微球与苯胺单体总质量分数的40%时, 其电导率可达到0.71 S/cm. 红外光谱结果证实了P(St-BA-AN)种子微球中的氰基和壳层中聚苯胺的胺基之间存在某种相互作用, 导致核壳结构复合物电导率的提高.

关键词: P(St-BA-AN)/PANI; 核-壳结构; 复合微球; 导电高分子

### Preparation and Electrical Property of Monodisperse P(St-BA-AN)/PANI Core/Shell Composite Particles

YAN Jian-Hong<sup>1</sup>, HUANG Li-Yan<sup>1\*</sup>, LIU Zheng-Ping<sup>2\*</sup>, ZHANG Jun-Gang<sup>1</sup>, HOU Wen-Bo<sup>1</sup>

1. College of Chemistry,
2. Key Lab of Environmentally Friendly and Functional Polymer Materials, Beijing Normal University, Beijing 100875, China

#### Abstract:

Monodisperse poly(styrene-butyl acrylate-acrylonitrile)[P(St-BA-AN)] latex particles were successfully coated with polyaniline(PANI) by seed emulsion polymerization method. Conductivity of P(St-BA-AN)/PANI composite microspheres can be controlled by changes of the components of seed latex, the amount of oxidant, aniline and other conditions. Proofs for the synthesis of core/shell composite particles were obtained via scanning electron microscopy(SEM), transmission electron microscopy(TEM), Fourier transform infrared(FTIR) spectroscopy and diffuse reflectance spectroscopy. It was found that the electrical conductivity of core/shell composites significantly increased by introducing of acrylonitrile into the copolymer latex particle. The conductivity for the P(St-BA-AN)/PANI(40%) core/shell composites was 0.71 S/cm by four-probe method. FTIR and IR diffuse reflection analysis confirmed that there is certain interaction between nitrile-group in P(St-BA-AN) and imine-group in PANI for the core/shell composites. The existence of the interaction of composite structure is an intrinsic factor that results in the increase of electrical conductivity. The mechanism of the interaction was proposed.

Keywords: P(St-BA-AN)/PANI; Core/shell structure; Composite particle; Conductive polymer

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通讯作者: 黄俐研, 女, 博士, 副教授, 从事功能高分子材料研究. E-mail: hly@bnu.edu.cn; 刘正平, 男, 博士, 教授, 博士生导师, 主要从事光电磁功能高分子材料和环境友好高分子材料研究. E-mail: lzp@bnu.edu.cn

作者简介:

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