

论文

## 纳米SiO<sub>2</sub>/聚丙烯酸酯复合乳液的制备与表征

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**摘要** 根据核壳乳液聚合理论,以经过硅烷偶联剂表面改性的纳米SiO<sub>2</sub>为种子,采用适当的乳液聚合工艺,制备了纳米SiO<sub>2</sub>/聚丙烯酸酯复合乳液,并表征了其性能.结果表明,纳米SiO<sub>2</sub>经过改性后,硅烷偶联剂接枝在其表面;以其为种子制备的复合乳液具有核壳结构,其热稳定性有所提高.

**关键词** [纳米SiO<sub>2</sub>](#) [聚丙烯酸酯](#) [乳液聚合](#)

分类号

## PREPARATION AND CHARACTERIZATION OF NANO-SiO<sub>2</sub>/ACRYLIC RESIN COMPOSITE LATEX

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**Abstract** The nano-SiO<sub>2</sub> / acrylate resin composite latex was synthesized by *in situ* emulsion polymerization of methyl methacrylate(MMA)and butyl acrylate(BA)in the presence of nano—SiO<sub>2</sub> particles,which were modified by silane coupling agent 3-(trimethoxysilyl)propyl methacrylate. The surface properties and dispersibility of nano-SiO<sub>2</sub> after modification,chemical structure,Zeta potential and diameter distribution of the composite latex prepared and thermal stability of the hybrid film formed bY the composite latex were investigated by Fourier transform infrared spectrometer (FT-IR),transmission electron microscopy(TEM),Zeta meter,Zeta Plus apparatus(dynamic light scattering method)and thermogravimetric analysis(TGA),respectively. After modification with silane coupling agent,silane was grafted onto the surface of nano—SiO<sub>2</sub> to form the organic layers,which were able to efficiently prevent the silica nanoparticles from aggregation in the *in situ* emulsion polymerization system and improve the compatibility of silica nanoparticles with the acrylate monomers. The nano—SiO<sub>2</sub> / acrylate resin composite latex prepared had the properties of silica nanoparticles and pure acrylate latex but was not simply a combination. Strong chemical bonding tethered the silica and acrylate chains to form the core / shell structural composite latex. Consequently,the hybrid film formed by the composite latex exhibited a better thermal properties than the pure acrylate latex film.

**Key words** [Nano-SiO<sub>2</sub>](#) [Acrylic resin](#) [Emulsion polymerization](#)

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