Monodisperse anisotropic particles have tremendous potentials in materials science and engineering, such as optics, dielectrophoresis and suspension rheology. As one of this kind of materials, snowman-like particles have drawn a special attention in the aspects of both synthesis mechanisms and applications. In this study, we synthesized micron-sized snowman-like poly(methyl methacrylate) (PMMA) particles via a seed emulsion method, in which process the cross-linked PMMA seed was swollen by MMA solutions at room temperature and then polymerized at 75°C. To induce semiconducting properties to the particles, they were coated with polyaniline (PANI) and dedoped in a NaOH solution similar to core/shell structured PANI/PMMA microbead. The morphologies of both pure and coated particles are shown in Fig. 1.

When these semiconducting anisotropic particles are dispersed in silicone oil, they exhibit electrorheological (ER) properties of yield stress and dramatically increased shear viscosity of a suspension due to chain formation by the dispersed particles under an electric field. We analyzed these anisotropic particle based ER fluid using a rotational rheometer by applying various electric field strengths. A flow curve of shear stress vs. shear rate was fitted using a rheological equation of state in a broad shear rate range. The dielectric spectra, as supporting data for the ER effect, were also measured using a LCR meter. It was further found that the relaxation time of this ER fluid was relatively shorter than typical ER fluid, explaining their relation to the ER characteristics.

![Figure 1. SEM images of pure snowman-like particles (a) and PANI coated snowman-like particles (b).](image-url)

**References**


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