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A facile synthesis of hierarchical flower-like TiO₂ wrapped with MoS₂ sheets nanostructure for enhanced electrorheological activity

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ABSTRACT: Flower-like TiO₂@MoS₂ nanocomposite with a hierarchical and core@shell structure was synthesized using a two-step hydrothermal method, in which the flower-like Ti-containing precursor backbone was initially prepared to provide a large surface to enable the MoS₂ sheets to coat on TiO₂ uniformly. The glucose and acetate ion (Ac⁻) were found to play a crucial role in the formation of the intimate interface between TiO₂ and MoS₂. The hierarchical composite was dispersed in silicone oil as ER fluids at 10 wt%, which exhibited a high ER efficiency by combining the advantages of TiO₂ hierarchical structures and suitable conductivity of MoS₂ sheets. The high polarization strength and suitable dielectric relaxation of ER fluid was obtained under electric fields, which led to the improvement of interfacial polarization and ER activity.

Key words: Core@shell structure; Electrorheological fluid; Hydrothermal method; 2D nanocomposite; Hierarchical structure

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