Fe_2O_3@TiO_2 filled poly acrylate thermal insulation coatings by hydrothermal process

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The composite of poly acrylate (PA) and Fe_2O_3@TiO_2 was a promising thermal insulation pigment for energy-saving coating materials. The introduction of acrylate-based segments results in the improvement in mechanical stability, solvent and chemical resistance and toughness in comparison with water born polyurethane (WPU). This work demonstrated a hydrothermal method and etching by HCl solution for fabricating PA/ Fe_2O_3@TiO_2 composites with improved dispersion of Fe_2O_3@TiO_2 nanoparticles. This approach was mainly concerned with the PA and yolk-shell type Fe_2O_3@TiO_2 nanoparticles. The comparison study demonstrated that resulting Fe_2O_3@TiO_2 and yolk-shell type Fe_2O_3@TiO_2 nanoparticles filled PA coatings outperformed those made by physical blending method over optical properties owing to a good dispersion of yolk-shell type Fe_2O_3@TiO_2 nanoparticles. In particular, the coatings filled with 8 wt % yolk-shell type Fe_2O_3@TiO_2 nanoparticles reduced the temperature of a designed "room" by ~15 ℃ than unfilled counterparts, but merely blocked ~15% visible light.