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Facile preparation of durable superhydrophobic coating with self-cleaning property

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ABSTRACT

A facile one-pot route was proposed to prepare a superhydrophobic P25 (nano TiO₂)/ATP (attapulgate)/ER (epoxy resin)/PDMS (polydimethylsiloxane) coating with good durability and self-cleaning property. The influences of the components, e.g. the mass ratio of P25 to ATP, the amount of ER, on the wettability and morphology of the coating surface were investigated. The morphology and the hydrophobicity of the as-prepared P25/ATP/ER/PDMS composite coatings were observed and measured by SEM and contact angle goniometer, respectively. The components of the coating were analyzed by FT-IR. And the abrasion resistance of the coating was carried out by sandpaper abrasion tests. The results showed that the coating exhibited a good superhydrophobicity with a water contact angle (WCA) above 150° and a sliding angle (SA) of 6.7° under the optimal component formula condition, i.e., the mass ratio of ATP to P25 was 1.7:0.3, and amount of ER was 0.28 g. And the coating could maintain the superhydrophobicity even after 280 cm of abrasion length. Additionally, the superhydrophobic P25/ATP/ER/PDMS coating exhibited high thermal stability, good repellency for acidic and basic solutions, and good non-wetting property. Therefore, the as-prepared superhydrophobic P25/ATP/ER/PDMS coating with micro-nanoscale roughness may be a potential candidate to meet the emerging requirements in practical applications, such

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