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Superhydrophobic Silica Antireflective Coatings with High Transmittance via One-Step Sol-Gel Process

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ABSTRACT: Silica antireflective coatings on solar glass are known to increase the current output by a few percent, but poor hydrophobicity will hamper the performance of the coatings. Coatings with high transmittance and excellent superhydrophobicity were prepared via low cost sol-gel dip-coating method. Using tetraethylorthosilicate and trimethylethoxysilane as co-precursors, the base-catalyzed hydrolysis leads to the formation of a hybrid sol with silica nanoparticles enriched in methyl groups. The maximum transmittance reaches 97.1% and 98.8% and the water contact angle reaches up to 152°. The porosity and the surface roughness of the nanocomposite coatings were taken into consideration, which give rise to refractive index change and the light scattering. This article may provide effective strategies to fabricate superhydrophobic antireflection coatings and the modified coatings possess advantages of low manufacturing cost, superior antireflective performance, good self-cleaning properties and feasible method for large area fabrication.

KEY WORDS: Antireflective coatings; Superhydrophobic; Sol-gel; Silica; trimethylethoxysilane

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