

Growth of Titania Nanoparticles Assists Self-Cleaning Features of Glass

ABSTRACT

Self-cleaning glasses became demanding for various advanced applications due to their manifold advantages. In this view, tellurite glasses containing titania nanoparticles (TiO_2 NPs) with varying concentration were synthesized using standard melt-quenching. The TEM images of the glasses showed the presence of elongated TiO_2 NPs with lattice spacing of 3.78 Å. TiO_2 NPs are found to grow further in the longitudinal and transverse axes ranging from 7–23 nm and 5–10 nm for TZETi glass and from 8–27 nm and 6–14 nm for TZETi-HT345 glass. The observed reduction in the water contact angle from 67.5° to 34.7° of the glasses indicated their hydrophilic nature. Growth of TiO_2 NPs induced by the heat treatment process reduces the water contact angle due to water droplets that tends to form a film and reduces water contact angle which in turn facilitates the removal of dirt on the glass surface. It was demonstrated that by adjusting the shape and size of TiO_2 NPs tailored the hydrophilic traits of the glasses.