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The Effect of TiO_2 Nano-Thin Films on Light Transmission and Self-Cleaning Capabilities of Glass Surface

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Abstract : Self-cleaning surfaces have become essential in various applications. For instance, in photovoltaics, they provide an easy-cost effecting way to keep the solar cells clean. Titanium dioxide (TiO_2) nanoparticles were fabricated at different thicknesses to study the effect of different thicknesses on the hydrophilicity behavior of TiO_2, eventually leading to customizing hydrophilicity levels to desired values under natural light. As a result, a remarkable increase was noticed in surface hydrophilicity after applying thermal annealing on the as-deposited TiO_2 thin-films, with contact angle dropping from around 85.4^o for as-deposited thin-films down to 5.1^o for one of the annealed samples. The produced thin films were exposed to the outside environment to observe the effect of dust. The transmittance of light using UV-VIS spectroscopy will be conducted on the lowest and highest thicknesses (5-40 nm); this will show whether the Titania has successfully enabled more sunlight to penetrate the glass or not. Surface characterizations, including AFM and contact angle, have been included in this test.

Keywords : physical vapor deposition, TiO_2, nano-thin films, hydrophobicity, hydrophilicity, self-cleaning surfaces
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