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## Fabricating superhydrophobic surfaces for self-cleaning applications by two-step simple spray coating process

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Superhydrophobic surfaces have recently attracted a lot of attention due to their high water repellency along with a wide range of applications in many fields. The application of such surfaces for self-cleaning purposes, such as in solar cell modules, has been limited due to the lack of mechanical robustness, thermal stability and ultraviolet radiation resistance. The fabrication of superhydrophobic water-repellent surfaces with mechanical robustness and high transmittance remains a major challenge. The focus of this work is to prepare highly transparent water-repellent surfaces with improved mechanical stability/robustness by simple spray coating process. The developed coating solution can be sprayed on all kinds of materials surfaces to create a superhydrophobic self-cleaning surfaces. Proper molar ratios of Methyltrimethoxysilane (MTMS) and (3-Glycidyoxypropyl) trimethoxysilane (GLYMO) are used to bond the functionalized silica nanoparticles to various substrates and promote robustness. Optimum spraying cycles (layers) of 1.0%wt SiO<sub>2</sub> nanoparticles after adhesive layer has resulted in contact angles of the order of 170° with a hysteresis of 6° and sliding angle of 1°. Developed surfaces also exhibited excellent stability under simulated outdoor conditions, such as pressurized jet water, abrasion and ultraviolet radiations etc. Improvement of surface transmittance was achieved by annealing the surface under temperatures up to 300°C without losing superhydrophobicity. The optical transmittance of the optimum annealed surface varied between 75% of that of virgin glass, at the visible light wavelength of 400nm and 90% at 800nm. The developed surface during this research makes them a promising candidate for outdoor self-cleaning applications even under harsh environmental conditions.

### Biography

Abduliken Bake has completed his Bachelor's degree in Polymer Materials and Engineering from Beijing Technology and Business University in 2013. After one year of work in food processing company, he joined King Fahd University of Petroleum and Minerals (KFUPM) for Master degree in 2014. He is currently pursuing his PhD in Mechanical Engineering at KFUPM.

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