

Nano Sol Based Solar Responsive Smart Window for Aircraft

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Abstract : This research work was based on developing a solar responsive aircraft window panel which can be used as a self-cleaning surface and also a surface which degrade Volatile Organic compounds (VOC) available in the aircraft cabin areas. Further, this surface has the potential of harvesting energy from Solar. The transparent inorganic nano sol solution was prepared. The obtained sol solution was characterized using X-ray diffraction, Particle size analyzer and FT-IR. The existing nano material which shows the similar characteristics was also used to compare the efficiencies with the newly prepared nano sol. Nano sol solution was coated on cleaned four aircraft window pieces separately using a spin coater machine. The existing nano material was dissolved and prepared a solution having the similar concentration as nano sol solution. Pre-cleaned four aircraft window pieces were coated with this solution and the rest cleaned four aircraft window pieces were considered as control samples. The control samples were uncoated from anything. All the window pieces were allowed to dry at room temperature. All the twelve aircraft window pieces were uniform in all the factors other than the type of coating. The surface morphologies of the samples were analyzed using SEM. The photocatalytic degradation of VOC was determined after incorporating gas of Toluene to each sample followed by the analysis done by UV-VIS spectroscopy. The self-cleaning capabilities were analyzed after adding of several types of stains on the window pieces. The self-cleaning property of each sample was analyzed using UV-VIS spectroscopy. The highest photocatalytic degradation of Volatile Organic compound and the highest photocatalytic degradation of stains were obtained for the samples which were coated by the nano sol solution. Therefore, the experimental results clearly show that there is a potential of using this nano sol in aircraft window pieces which favors the self-cleaning property as well as efficient photocatalytic degradation of VOC gases. This will ensure safer environment inside aircraft cabins.

Keywords : aircraft, nano, smart windows, solar

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