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Study of solar radiation at various incident angles on soft chemistry based transparent conducting oxide (TCO) coated window glass

Solar radiation ($\sim 0.2\text{--}2.5\ \mu\text{m}$) on earth surface involves illumination and heat generation as it covers the electromagnetic waves of visible and near-IR region. The Air Mass (AM) spectrum of solar radiation shows irradiance decreases with the increase in tilted angle. Hence, designing of window glass system should be made in such a manner that solar radiation should enter the room at high angle of incidence highlighting reasonable illumination (100–300 lux) and suitable thermal comfort. To remove the unwanted heat absorption by glass, a suitable layer of low thermal emissivity with heat reflection property should be deposited onto the window glass. On the basis of this idea a low-e material, Indium Antimony Oxide (IAO) (In: Sb=97:07), a wide band gap semiconductor (band gap, $\sim 3.5\ \text{eV}$) has been chosen and deposited on to window glass of dimensions, 500 mm x 500 mm by soft chemistry method. The developed film is transparent in the visible and electrically conducting with $>25\%$ reflection in the Mid-IR region. The performance of the film as window glass fenestration in day time is characterized by evaluating direct solar optical properties from the spectral data measured at different angles of incidence by UV–VIS–NIR spectroscopy. Major work was executed at CSIR-CGCRI, India in collaboration with the School of Energy Studies, Jadavpur University, and Kolkata, India. The outcome of the work is prospective and this will be discussed in the talk.

Biography

Prasanta Kumar Biswas has done his PhD from Calcutta University, joined CSIR-CGCRI as a Scientist in 1984 and initiated developmental work on soft chemistry based thin films on glass for optics and nanostructured semiconductors. He has about 150 publications, six Indian patents and led international collaborative projects with Germany, France, USA, Japan and Slovenia. He retired in 2012 as a Chief Scientist. He was then in IIT Roorkee as an Honorary Fellow. Currently, he is Honorary Visiting Professor of Barasat College, WBSU. He is the recipient of MRSI Medal award from Material Research Society of India and the elected Fellow of FAScT of WAST, India.

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