

4th International Conference and Exhibition on **Materials Science & Engineering** September 14-16, 2015 Orlando, USA

Polymer-ceramic composite film fabrication and characterization for harsh environment applications

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Polymer-ceramic composites are gaining importance due to their high specific strength, corrosion resistance, and high mechanical properties as well as low cost. As a result polymer composites are suitable for various industrial applications, like automobiles, aerospace and biomedical areas. The present work comprises development of polymer/ceramic composite films and are tested for harsh environment including weatherability and UV-barrier properties. The polymer composite films are kept in weather chamber for a fixed period of time followed by testing for their physical, mechanical and chemical properties. The composites films are fabricated using compounding followed by hot pressing. UV-Visible spectroscopy results reveal that the pure polymer polyethylene (PE) films are transparent in the visible range and do not absorb UV. However, polymer ceramic composite films start absorbing UV completely even at very low filler loading amount of 5 wt%. The changes in the tensile properties of the various composite films before and after UV illuminations for 40 hrs and at 60°C were observed. The tensile strength of the neat PE film has been observed as 8% reduction, whereas a remarkable increase in tensile strength has been observed (18% improvement) for 10 wt% filled composite films. The UV exposure leads to strengthening of the cross-linking among PE polymer chains in the filled composite films, which contributes towards the incremented tensile strength properties.

Biography

Santiranjana Shannigrahi has completed his PhD from Indian Institute of Technology. He is working as a Scientist in IMRE, an A*STAR (Agency for Science, Technology and Research) research institute in Singapore. He has published more than 80 papers in reputed journals and has been serving as an Editorial Board Member of repute.

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