

## Modified Surface Morphology, Structure and Enhanced Weathering Performance of Polyester-Urethane/Organoclay Nanocomposite Coatings

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**Abstract :** Organoclay loaded (0-5 weight %) polyester-urethane (PU) coatings were prepared with a branched hydroxyl-bearing polyester and an aliphatic poly-isocyanate. TEM micrographs show partial exfoliation and intercalation of clay platelets in organoclay-polyester dispersions. AFM surface images reveals that the PU hard domains tend to regularise and also self-organise into spherical shapes of sizes 50 nm (0 wt %), 60 nm (2 wt %) and 190 nm (4 wt %) respectively. IR analysis shows that PU chains have increasing tendency to interact with exfoliated clay platelets through hydrogen bonding. This interaction strengthens inter-chain linkages in PU matrix and hence improves anti-ageing properties. 1000 hours of accelerated weathering was evaluated by ATR spectroscopy, while yellowing and overall discoloration was quantified by the  $\Delta b^*$  and  $\Delta E^*$  values of the CIELab colour scale. Post-weathering surface properties also showed improvement as the loss of thickness and reduction in gloss in neat PU was 25% and 42%; while it was just 3.5% and 14% respectively for the 2 wt% nanocomposite coating. This work highlights the importance of modifying surface and bulk properties of PU coatings at nanoscale, which led to improved performance in accelerated weathering conditions.

**Keywords :** coatings, AFM, ageing, spectroscopy

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