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Development of Epoxy-Urethane Hybrid Coatings via non-isocyanate route

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Abstract:

Non-isocyanate route of urethane synthesis based on reaction of cyclic carbonated compound with amines is well known. Taking inspiration from this, we have synthesized a monomer containing urethane linkage through the reaction of propylene carbonate with ethylene diamine. This monomer was further reacted with commercial epoxy polymer to obtain hybrid epoxy-urethane adduct. Synthesized adduct was then cured with various structural amines such as isophorone diamine (IPDA), Jeffamine T-403 and diaminodiphenyl methane (DDM). The resultant epoxy-urethane hybrid coatings were characterized for mechanical, chemical, thermal and anticorrosive properties. The hybrid coatings exhibited at par mechanical, chemical and corrosion resistance as compared to that of commercial epoxy coatings. DSC and TGA analysis revealed that glass transition temperature, thermal stability and char yield of hybrid coatings was higher than that of commercial epoxy coatings.

Keywords: non-isocyanate, cyclo-carbonate, organic-organic hybrid, epoxy-urethane, structure-property relationship.

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