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Abstract

In recent years, global concerns with respect to depletion of petro-based resources and the research development according to the principles of green chemistry have stimulated the utility of sustainable feed stocks in the synthesis of industrially important polymers. Renewable resources like cellulose, chitosan, starch, and vegetable oils (VO`s) have been widely used as raw materials for the preparation of various polymeric materials. Among these, VO`s are considered to be an ideal alternative chemical feed stocks because of their "green" origin, inherent biodegradability, low-cost, easy availability and the presence of various active functional sites amenable to the chemical reactions. Further, inexpensive triglycerides have widely been used in various applications such as inks, lubricant resins, plasticizers and coatings. However, oil-based polymers fail to give good strength, alkali resistance, stiffness, and rigidity which limit their use for industrial applications. Thus, there is a need to modify oil-based polymers with suitable moieties to obtain reasonably useful

materials that find applications in various industries like inks, lubricants, adhesives, especially in paints and coatings.

The possibility to combine the useful properties of organic and inorganic components in the form of composite materials is one of the possible solutions to improve the properties of VO polymers. Further, the combinations of inorganic and organic phases in a single material, at nanoscale level have made accessible an immense new area of materials science that has extraordinary implications in the development of multifunctional materials. Keeping in mind the significance of organic inorganic hybrid (OIH) polymers, the present thesis has concentrated on the development of nanostructured metal and metal oxides nanoparticles of different morphology, involving green route of synthesis and their dispersion as nanofiller in VO derived polymer matrix that resulted in the formation of OIH polymers having value added properties. The natural polyol was first time used for the synthesis of nanofillers, which simultaneously acts as solvent, reducing agent and template for the metal precursor. These nanoparticles have been well characterized using different analytical techniques: FT-R, XRD, TEM, VSM and TGA. The incorporation of these nano-inorganic fillers in the organic matrix on the hydrophobicity, physico-mechanical (scratch hardness, bend test and impact resistance) and corrosion resistance performance of the developed OIH coatings: DG-PA-TIP, ESODG-PA-NiO, and SMGPU-TEOS. Further, it can be concluded that there is still immense scope for the future research and improvement in various properties of vegetable oil based OIH polymer nanocomposites and generation of new improved nanofillers for the development of OIH polymeric coatings.