SYNTHESIS AND FEATURES OF PLANT OIL-BASED LATEXES

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The problem of exhaustion of sources of petrochemical raw materials has become world-class and is complicated not only by economic but also by environmental and political factors. The environmental analysis shows that huge amounts of plastic waste are dumped or left in the environment, and their contribution to the ever-increasing solid waste amount is a significant environmental threat.Partial replacement of synthetic raw materials with a renewable provides a platform for the creation of polymers/composites with a wide range of properties, including biocompatibility, the ability to compost, and biodegradation. Due to the large assortment of plant oils, their diversity of composition, virtually inexhaustible renewable resources, they are an interesting subject of study.

Recently, due to the miniemulsion copolymerization of plant oil-based monomers (POBMs) with petroleum-based comonomers was obtained series of stable latexes with an average particle size of 50–100 nm and 5–55wt% of biobased content, exhibiting stability at room temperature within several months. After polymerization, the double bonds of fatty acid fragments in plant oil-based monomers remain mostly unaffected and were further used for the crosslinking of latex films. Preparation of polymeric coatings from the plant oil-based monomers through theincorporation of the hydrophobic fatty acid chains into the macromolecules of latex polymers allowsfor the formation of polymer networks with a controlled cross-linking density along with enhancing thewaterresistance of the coatings. The incorporation of plant oil-based fragments provides the plasticizing effect to the resulting latex copolymers, as seen by a noticeable decrease of glass transition temperature by increasing plant oil-based monomers content in the resulting copolymers. The obtained results clearly show the potential of POBMs as candidates for internal plasticization of polymericmaterials through radical copolymerization into a macromolecular structure and reducing intermolecular interactionsin copolymers.Also, it has been shown that plant oil-basedfragments enhance the hydrophobicity of the latex filmcoatings; thus, these can be considered as additives toreduce water sensitivity of the polymer materials(coatings).

Therefore, the use of POBMs bring significant benefits for polymeric materials (controlled physical, chemical, mechanical and performance characteristics, controlled biodegradability, non-toxicity, etc.) as well as improve the recycling process due to their inherent biodegradability, and thus save efforts and costs in terms of health and safety regulations. The resulted plant oil-based polymers have shown the promise to be alternatives for improving polymeric materials properties in various applications (waterproof coatings, adhesives, paints, etc.).