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Sustainable Radiation Curable Palm Oil-Based Products for Advanced Materials Applications

Authors : R. Tajau, R. Rohani, M. S. Alias, N. H. Mudri, K. A. Abdul Halim, M. H. Harun, N. Mat Isa, R. Che Ismail, S. Muhammad Faisal, M. Talib, M. R. Mohamed Zin

Abstract : Bio-based polymeric materials are increasingly used for a variety of applications, including surface coating, drug delivery systems, and tissue engineering. These polymeric materials are ideal for the aforementioned applications because they are derived from natural resources, non-toxic, low-cost, biocompatible, and biodegradable, and have promising thermal and mechanical properties. The nature of hydrocarbon chains, carbon double bonds, and ester bonds allows various sources of oil (edible), such as soy, sunflower, olive, and oil palm, to fine-tune their particular structures in the development of innovative materials. Palm oil can be the most eminent raw material used for manufacturing new and advanced natural polymeric materials involving radiation techniques, such as coating resins, nanoparticles, scaffold, nanotubes, nanocomposites, and lithography for different branches of the industry in countries where oil palm is abundant. The radiation technique is among the most versatile, cost-effective, simple, and effective methods. Crosslinking, reversible addition-fragmentation chain transfer (RAFT), polymerisation, grafting, and degradation are among the radiation mechanisms. Exposure to gamma, EB, UV, or laser irradiation, which are commonly used in the development of polymeric materials, is used in these mechanisms. Therefore, this review focuses on current radiation processing technologies for the development of various radiation-curable bio-based polymeric materials with a promising future in biomedical and industrial applications. The key focus of this review is on radiation curable palm oil-based products, which have been published frequently in recent studies.

Keywords : palm oil, radiation processing, surface coatings, VOC
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