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Biodegradable biorenewable polymeric nano composites for food packaging applications

Tarek M Madkour and Samar Fadi
The American University in Cairo, Egypt

Biodegradable-biorenewable polymers may provide an excellent alternative to petroleum-based polymers but their poor mechanical, thermal and barrier performance may form an obstacle to their full utilization as food packaging materials. In the current work, bionanocomposites were prepared with various nanofiller particles in order to improve their overall performance as food packaging and storage materials. Both the biopolymeric matrix and the reinforcement agents are based on natural renewable materials namely poly lactic acid (PLA) and functionalized and non-functionalized carbon nanotubes and graphene nanoplatelets, respectively. Use of the bionanocomposites comes with the advantage of sustainable development from shifting the dependency of using the limited supply of fossil fuel resources for the production of the packaging materials to using renewable natural resources for the production of biodegradable materials that can break down easily and diffuses naturally back into the environment. The addition of nano-sized fillers has efficiently improved the mechanical and barrier properties of the materials provided that the nanofiller particles are well dispersed into the matrix. It was observed that the incorporation of functionalized nanofillers into the PLA matrix enhanced its rate of degradation and hence markedly decreased the thermal stability of the resulting nanocomposites. Control of the thermal degradation of the biopolymer nanocomposites was also achieved by controlling the amount and type of the nanofillers. Good quality bionanocomposite films with low porosity and well dispersed nanofiller particles were obtained as indicated from the scanning electron microscopy micrographs.

Biography

Tarek M Madkour has completed his PhD in 1992 from University of Cincinnati, OHIO and Postdoctoral studies from the Catholic University of Leuven, Belgium. He was awarded the Fulbright Fellowship award, the state of Egypt award, the Polymer Society of Japan award and the Showman foundation award. He has published more than 70 papers in reputed journals, delivered more than 20 international conference presentations and supervised more than 15 PhD and MSc thesis.

tarekmadkour@aucegypt.edu

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