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The use of nanotechnology in biodegradable films and coatings

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In recent years, bio-based products have emerged as alternative to petroleum-based polymers in relevant niches of the packaging industry. The bio-based packaging is made from raw materials originating from natural sources, such as starch, cellulose, chitin or bio-degradable synthetic polymers such as, polycaprolactone and polylactic acid. In spite of several desirable properties of biodegradable polymers (e.g. fully renewable, non toxic), some properties like melt strength, impact strength, thermal stability, permeability, etc still do not meet the demands for some end-use applications and must be improved. One way to improve the properties of biopolymers and greatly enhance their commercial potential is to incorporate nanosized reinforcement in the polymer. In this research work, some of traditional nanosized reinforcements such as clay and more recent such as cellulose nanocrystals will be presented in applications like food packaging, mulching films and coatings in order to extend shelf life of fresh fruits. Some examples of current research of our group will be presented.

Biography

Farayde Matta Fakhouri has completed her PhD at the University of Campinas (UNICAMP) and postdoctoral studies at the University of Londrina (UEL) and Brazilian Agricultural Research Corporation (EMBRAPA). She is currently Professor at Faculty of Engineering, in the University of Grande Dourados (UFGD) and Researcher Contributor at the Faculty of Chemical Engineering at UNICAMP. She has published more than 16 papers in reputed journals and has served as an editorial board member of repute. Also she has over 5 chapters of books published internationally and two patent applications.

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Structural and magnetic properties of nickel-cobalt nanomaterials synthesized by citrate-gel auto combustion method

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Nano-ferrites of the composition $Ni_{1-x}Co_xFe_2O_4$ (where x=0.0, 0.2, 0.4, 0.6, 0.8 and 1.0) were synthesized at a very low temperature (180°C) by citrate-gel auto combustion method. The synthesized powders were sintered at 500°C for four hours in an air and were characterized by X-ray diffraction (XRD) which confirmed the formation of cubic spinel structure of ferrites. The crystallite size was in the range of 20 nm to 31 nm. Nanosized ferrites with uniform particle size and narrow size distribution are desirable for a variety of applications like targeted drug delivery, medical imaging magnetic data storage, and other biomedical applications, magnetic data storage, etc. Morphological studies by Transmission electron Microscopy (TEM), Scanning Electron Microscopy (SEM) revealed formation of largely agglomerated, well defined nano particles of the sample. Elemental composition characterizations of the prepared samples were performed by Energy Dispersive Spectroscopy (EDS) which shows the presence of Ni, CO, Fe and O without precipitating cations. Magnetic properties of Ni-Co nanoferrites were measured using a vibrating sample magnetometer at roomtemperature in the applied field of 15 kOe. The specific saturation magnetization (M_s), remanent magnetization (M_r) and the coercivity (H_c) of the spinel ferrites are further improved by the substitutions of Co^{+2} ions.

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