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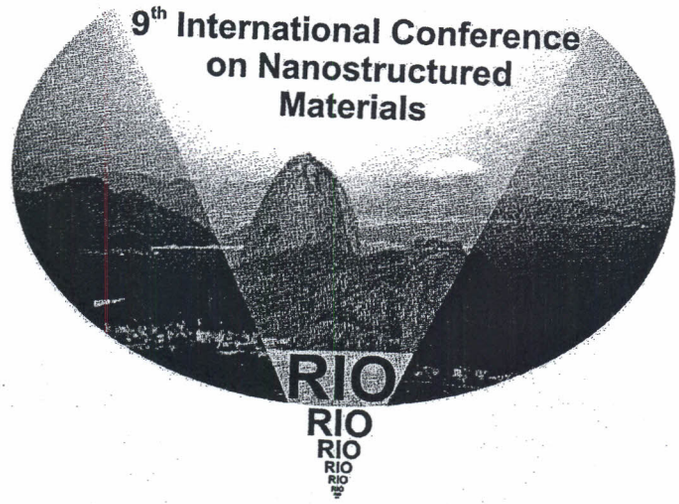

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ABSTRACTS

Synthesis and thermal analysis of chitosan nanoparticles

F. A. Aouada[1,2], M. R. de Moura[1,2], L. H. C. Mattoso [2]

[1] *Chemistry Dept. – UFSCar, São Carlos, São Paulo, Brazil*

[2] *National Nanotechnology Laboratory for Agriculture , EMBRAPA-CNPDIA, São Carlos, São Paulo, Brazil*

Nanoparticle synthesis is currently intensely investigated due to its wide variety of potential applications [1,2], including food processing, biomedical, optical, and electronic devices. The use of natural polysaccharides in the preparation of nanoparticles has attracted attention because of their biocompatibility, biodegradability, and hydrophilic properties. In this work, chitosan nanoparticles (CS-PMAA) were obtained in different conditions by the polymerization of methacrylic acid (MAA) in the presence of chitosan (CS). The formation and thermal stability of CS-PMAA nanoparticles was investigated by nuclear magnetic resonance (NMR), differential scanning calorimetry (DSC), and thermogravimetric analysis (TGA). The complex molar ratios used in the syntheses (in monomer unit) of n_{COOH}/n_{NH2} are 4.8:1 (0.2 in-wt%), 1.9:1 (0.5 in-wt%) and 1.2:1 (0.8 in-wt%). Particle size values of CS–PMAA nanoparticles prepared at pH 4.0 for this compositions were 111 ± 4; 82 ± 2 and 60 ± 4 nm, respectively. For CS-PMAA nanoparticles, the NMR peaks obtained were very close to those of CS and PMAA, showing some shift associated with the formation of CS-PMAA nanoparticles, which is an indication of the interaction between the two systems. The energy related to the cleavage of the electrostatic interactions between carboxylate and amide groups (ΔH) was based as total area of endothermic peak between 180 – 290 °C, as suggested in the literature [3]. Results showed that ΔH values are strongly influenced by the amount of CS. For nanoparticles prepared with 0.2, 0.5, and 0.8 (in-wt%) of CS, the values were 188.5, 64.3, and 36.8 J g^{-1}, respectively. The temperature of degradation (T_d) obtained using TGA technique for raw CS and nanoparticles with 0.2% of CS was 240 ± 2.0 and 143 ± 2.3 °C, respectively. When the amount of CS is increased, a pronounced increase in T_d can be observed. For nanoparticles prepared with 0.5, and 0.8 (in-wt%) of CS, the values of T_d were 242 ± 2.5 and 251 ± 2.3 °C, respectively. These results indicate that CS–PMAA nanoparticles are more thermally stables than raw CS.

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Corresponding author: Fauze Ahmad Aouada, fauze@cnpdia.embrapa.br

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