

Biomedical Application of Ferrofluids Containing Magnetite Nanoparticles - Based Buriti (*Mauritia flexuosa* L.) Oil Using Mössbauer and Nuclear Magnetic Resonance (NMR) Spectroscopies

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Abstract – Samples of ferrofluids, consisting in ferrite-like nanoparticles dispersed in Buriti oil were studied by X-ray diffraction and temperature dependent Mössbauer spectroscopy. Information about the particle mean size, the size dispersion and the effective anisotropy constant was obtained for each sample. Different magnetic relaxation processes were observed in dependence on the surfactant layers.

Ferrofluids have novel properties and their behaviour in magnetic fields leads to many interesting applications [1]. Although magnetic fluids are already used in some devices they have not yet been exploited to any extent. Buriti fruit was collected from a palm tree abundant in the Amazon region from Peru and Brazil. Elaborated sample of biocompatible magnetic fluids (BMF) was made as a mixture of prepared Fe_3O_4 nanoparticles and Buriti oil (BU- Fe_3O_4). Dried sample of BU- Fe_3O_4 was used for Mössbauer measurement. Development of biocompatible magnetic fluids (BMF) is one of the interesting fields in biomedical research. These magnetic fluids can be used as contrast agents for MRI, drugs deliverers, local thermal effect during cancer therapy, etc. Some of BMF consist of iron-containing magnetic nanoparticles [1]. Therefore, this type of BMF can be studied using Mössbauer and Nuclear Magnetic Resonance spectroscopy. In the present work we present preliminary results of the study of magnetite-based Buriti oil using Mössbauer, Nuclear Magnetic Resonance and another technics spectroscopics and DC magnetization. The ^1H and ^{13}C NMR spectra of buriti oil are given in Figure 1 and DC magnetization of Fe_3O_4 samples are given in Figure 2.

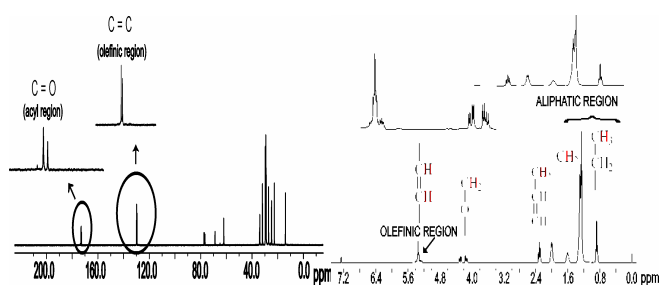


Figure 1: ^1H and ^{13}C RMN spectra of the Buriti oil.

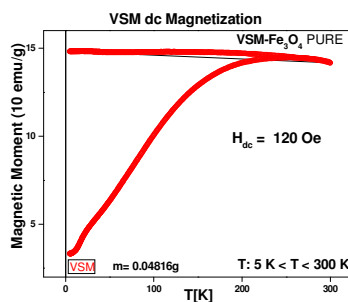


Figure 2: DC magnetization curves of Fe_3O_4 samples obtained applying a magnetic field of 120 Oe.

[1] Pankhurst Q.A., Connolly J., Jones S.K., Dobson J. Applications of magnetic nanoparticles in biomedicine. J. Phys. D: Appl. Phys. 36, R167 (2003).

Acknowledgements

The authors acknowledge the financial support of the Brazilian agencies, ELECTRONORTE, FINATEC, CTPETRO/FINEP, and MCT/CNPq-SEPLAN.