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Gold nanoparticles colloids on natural rubber membranes

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Abstract – Gold nanoparticles have been obtained on natural rubber (NR) membranes in several times of reduction in the solution of gold (Au^3) and H_2O at 80°C, where then it introduces the membranes. The particles were monitored way spectroscopy of absorption in the ultraviolet visible (UV-Vis). The formation of the nanoparticles occurred after 3 minutes and was characterized by presence of 560 nm absorption band, which is attributed to the surface plasmon of gold nanoparticles. Thermal analysis, carried out TG/FT-IR coupled; show that the nanoparticles do not interfere in the structure of the natural rubber.

This work shows study of characterization of natural rubber/gold nanoparticles (NR/Au) composites carried out by in situ reaction using NR membranes and aqueous gold tetracholorate solutions (Au), in different times of reduction. The synthesis was carried out using NR membranes obtained by casting onto glass slides at 25°C. These films were dipped in a 0.001M aqueous solutions of tethacloroaurate salt from Aldrich© at 80°C. The particle formation was monitored by UV-Vis absorption spectroscopy. The morphology and chemical structure were studied by atomic force microcopy (AFM) and attenuated total reflection infrared (ATR-IR). The formation of the nanoparticles occurred after 3 minutes and was characterized by presence of 560 nm absorption band, which is attributed to the surface plasmon of gold nanoparticles, exhibited in Figure (a). The composite electric conductivity (volume) increased ca. 6 orders of magnitude compared with the NR membrane which is equal to 10^{-12} S/cm. The thermal analyses of the composites performed by DSC and TG/FT-IR coupled. Figure (b) show measure of TG/FT-IR coupled, reveals that the gold nanoparticles do not interfere in the structure of the natural rubber, prevailing the transitions and the thermal stability obtained for natural rubber membrane. These composites possess potential applications in electronic devices due to its electrical and mechanical properties.

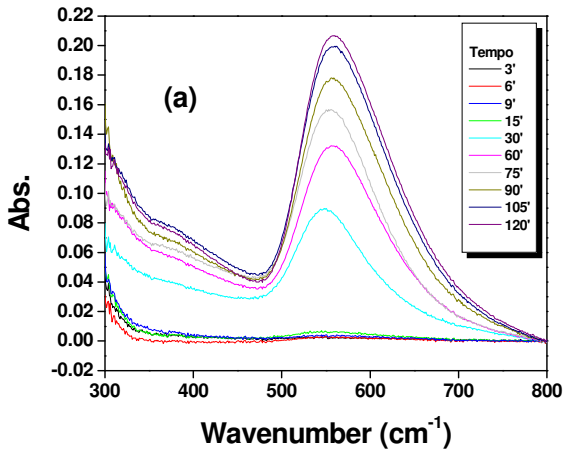

Figure (a): UV-Vis absorption spectra for the NR/Au growth kinetics reduced for different reduction times.

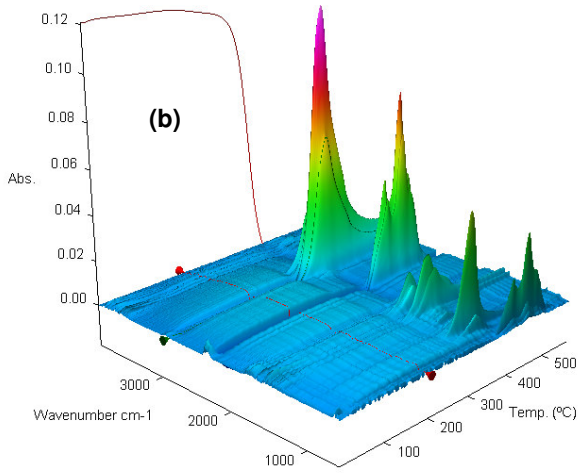

Figure (b): Thermal stability of the NR membranes by TG/FT-IR coupled

Acknowledgments

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