

## New perspectives on the applications of ternary nanocomposites based on a matrix of vulcanized natural rubber functionalized with nanoparticles oxides

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Ternary nanocomposites are functional triphasic materials involving at least one of the constituent phases that should belong to a scale size less than 100 nm. These simple materials have attracted scientific and technological interest because of its polifunctionality originated of the minor phase as magnetic and ferroelectric features. In the above sense, there is the possibility of unique combinations of properties being possible use in magnetic media and devices, raw materials for the production of flexible electronic devices and electromagnetic absorbers. This study is directed to characterize and identify distinct functionalities of nanocomposites of vulcanized natural rubber with different concentrations of ferroelectric ceramic nanoparticles of  $\text{KSr}_2\text{Nb}_5\text{O}_{15}$  and  $\text{Ni}_{0.5}\text{Zn}_{0.5}\text{Fe}_2\text{O}_4$ . The structural, thermal and morphological characterization of the nanocomposites was performed using FTIR, XRD, TG, DSC and SEM. Surface and volumetric homogeneity were investigated. These new nanocomposites exhibit innovative mechanical-magnetic and biological properties. Thermal stability of nanocomposites undergoes an increasing as a function of nanoparticles adding. In this sense, a relative increase of semi-crystallinity of the polymer chain was detected. Both stress/strain and tension/compression mechanical were carried out showing an increase of about 20% in the mechanical parameters that was modeled as a double effect generated by the competition between cross-linking and surface phenomena. Further, compression tests assisted by magnetic field were carried out and variations at about 38% in the compression parameters were reached. Experiments involving growth of colonies of *Leishmania brasiliensis* parasites were carried out showing the potential to alter the rate of growth of the parasite.

### Biography

Felipe Silva Bellucci is a PhD student in Materials Science at the Universidade Estadual Paulista – UNESP, Brazil. He has experience research in nanocomposites formed by natural rubber with ferroelectric and magnetic ceramic nanoparticles.

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