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Conductive composite obtained by mixture of residue industrial of leather and natural rubber with carbon black

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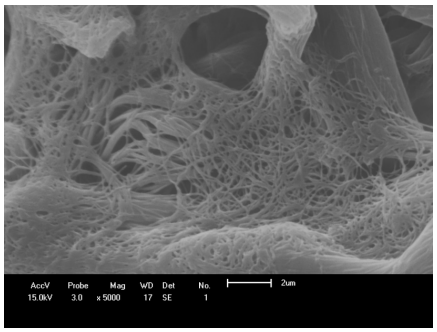
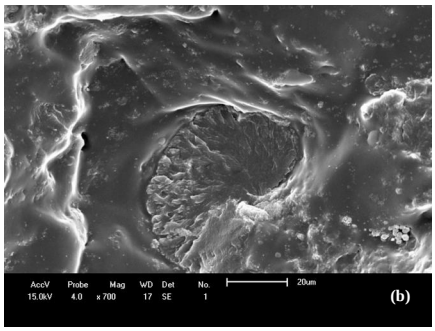
Abstract – The leather is a material that has very interesting properties and is used in the fabrication of several objects. However, for have the adjusted property is necessary realization of chemical treatment, otherwise it deteriorates rapidly. The final process in the industry occurs when the leather is passed in a machine to adjust its thickness and in this process is generated large amount of residues that until the moment do not have applications, causing big environmental problem. The present work was used this residue to prepare conductive composites combining natural rubber and carbon black. The composites were prepared by pressure in different temperatures, with electric conductive and good mechanical properties that are associated with the morphologic structure.

Conductive composites are materials prepared combining the physical properties of polymers and conductive particles. In this work the preparation and characterization of conducting composites containing natural rubber (NR), leather residue (LR) and carbon black (CB) are presented. Samples were conformed in different percentages of mass of the NR/LR/CB constituents: 38/60/2.0; 37.5/60/2.5; 37/60/3.0 and 36.5/60/3.5, respectively, applying a pressure of 12 tons during 5 minutes at the temperature of 160°C, resulting in membranes with good quality and with the desired thickness. The NR/LR/CB composites were characterized using optical microscopy (OM), scanning electronic microscopy (SEM), atomic force microscopy (AFM), Raman and infrared spectroscopy, thermogravimetry (TG), differential scanning calorimetry (DSC), dynamic mechanical analysis (DMA), mechanical test (stress vs. strain) and he electric conductivity measurements. The presence of the CB in composites NR/LR/CB provided an electric conductivity of the order of $1.5x10^{-3}$ $S.cm^{-1}$. Mechanical tests show that the NR/LR/CB composites have intermediate properties between the membranes of NR and the leather.



(a)



(b)

The leather is observed a structure fibrillar, characteristics of the collagen, as shown in the Figure (a). It is observed the interlacement of smaller fibers that they give origin the formation of larger fibers that acquire larger mechanical resistance through the tanning process to the chrome [1]. Figure (b) show SEM of the composites NR/L/CB, made in the proportion in mass of 38/60/2,0 (*wt*%). It was found that NR/LR/CB membranes can be easily prepared with very low cost. They presented good thermal stability, adequate mechanical and electric conductivity properties that are appropriate to produce gloves, blankets and antistatic floors. In addition, the NR/LR/CB composites are obtained from leather residues from tanneries, contributing for the reduction of an environmental problem.

References

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