Recycling of plastic cups and packaging of EPS to obtain nanocomposite with nanoclay and plaster

Suellen S. Bartolomei[1], Messias S. Machado[2], Julyana G. Santana[3], Esperidiana Moura[3], Helio Wiebeck[1]*

1- University of São Paulo, Department of Metallurgical and Materials Engineering.
*hwiebeck@usp.br

2- Science and Technology Federal Institute of Espírito Santo, Coordination of Electrotechnology and Electrical Engineering.
3- Nuclear and Energy Reserch Institute, Center for Chemical and Environmental Technology.

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Polystyrene is a polymer defined as brittle due to its mechanical properties, but still widely used industrially for its cost and processability. However, the fragility restricts its use in engineering applications. To improve the material, the addition of a plasticizer is recommended, because it acts between the polymer chains increasing its mobility and delaying the growth of cracks. Another method for improving the mechanical properties of a polymer is the use of a reinforcing phase thereby generating a nanocomposite. In this work the polystyrene of disposable plastic cups and expanded polystyrene packages were recycled using ethyl acetate. Together with the solvent, glycerin was added to plasticize the recycled polymer. Therefore, a solution was made containing recycled polystyrene and glycerin, this solution was allowed to stand until all solvent evaporated and a rigid film was obtained. Then, to improve the mechanical properties, three types of composite were prepared by melt extrusion, using a twin screw extruder machine. First, the recycled polystyrene of the cups was mixed with nanoclay (5% wt), afterwards the recycled polystyrene of the cups was mixed with nanoclay (5% wt) and gypsum (5% wt) and, in the third composite, it were mixed the recycled expanded polystyrene with gypsum particles (10% wt). Specimens were injected and tensile tests were performed to compare the mechanical properties of the composites obtained.