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Study of dispersion and compatibilization of sugarcane bagasse fibers (SF) embedded in matrix of poly(ethylene terephthalate) recycled (PETrec) during processing

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Abstract – The use of vegetable fiber as reinforcement for thermoplastics have attracted growing interest, especially for recycled thermoplastics. This study aimed to evaluate the conditions of polymer composites using vegetable fibers during mixing in single screw extruder. The polymer used was a poly(ethylene terephthalate) recycled (PETrec) obtained in the form of granules and the fibers regional are sugarcane bagasse fiber (SF). The mixture of composite PET_{rec}/SF was performed in a bench screw extruder. The visual effect of the composites gained a better visual appearance compared to pure PET recycled. It concludes with the this studies that the composite is a good alternative to new materials for technological application.

Currently, the large growth in the use of disposable PET bottles and pollution that this has caused to the environment makes it one of the polymers with high recyclability [1].

The use of vegetable fibers as filler, or as reinforcement material in composites ensures increased performance and technological applications, due to low cost, abundance and biodegradability [1]. The objective of this work is to use post-consumer polymers reinforced with sugarcane bagasse fibers (SF) and also with the use of a compatibilizing agent interfacial ethylene/n-butyl acrylate/glycidyl methacrylate (EBGMA) [2] in order to perform studies of processing extruded composite materials to develop new applications aimed at reusing plastic discards.

In this study we used a recycled poly(ethylene terephthalate) obtained in the form of granules of kindly donated by the Global PET, the sugarcane bagasse fibers (SF) is a regional fiber were kindly supplied by EDRA Ecosistema Ltda. A copolymer of an ethylene/n-butyl acrylate/glycidyl methacrylate copolymer (EBGMA), commercially known as Elvaloy® PTW from DuPont company were used as interfacial compatibilizing agents.

The materials were previously dried in vacuum oven (t = 15h, T = 60°C) and then mixed in a single screw extruder (D = 16mm, L / D = 26) at a speed of 50 rpm and temperature profile of 230/240/240°C using an array of flat ribbon with a thickness of 2.5 mm and a width of 25mm.

It was observed by scanning electron microscopy (MEV) equipment in a brand Philips XL 30 FEG the compatilization and dispersion of the fiber in to the polymer was effective even in a low shear extruder and short residence time.

We conclude that the composites PET_{rec}/SF and PET_{rec}/SF/EBGMA may be good alternatives for applying technology in product development of recycled polymers to replace wood in the furniture industry. Thus generating a synthetic product with recycled visual appearance of a natural product, besides being an environmentally friendly product.

Table 1 – Formulations of the composites

#	Materials	% weight
1	PET_{rec}	100
2	PET_{rec}/SF	95/5
3	PET_{rec}/SF/EBGMA	90/5/5

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