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Properties of coconut fibers reinforced polypropylene matrix

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Abstract –Natural coconut fiber is an excellent candidate to be used as a filler material on polymeric matrix because is a kind of waste that has attractive properties. In this work, water absorption and mechanical properties of polypropylene matrix composites reinforced with untreated and treated (2%NaOH) coconut fibers were evaluated according to ASTM D570-98 and ASTM D638-61T, respectively. Boxes based on fiber-reinforced composites containing until 20wt% of fiber were fabricated by injection molding. Electrical resistivity measurements were obtained applying 5 kVdc on samples to identify applications on electrical sector.

Injection molding is the main method used by plastics industry due to its high efficiency. Therefore, the combination of the injection techniques and natural fiber to manufacture industrial products, especially coconut fiber, is not still explored by researchers in order to enhance industrial productivity for these composites. In addition, previous studies shows that fiber composites require pretreating of the fibers using chemical agents [2,3] to increase the mechanical properties of composites. In this work, boxes based on coconut fiber-reinforced polypropylene matrix composites containing until 20 wt% of fibers (PP-Fiber), untreated and chemically treated (2vol%NaOH, 25°C) were fabricated by injection molding. Specimens were cut-out from its bottom. Water absorption analyses revealed the highest water incorporation to composites containing treated fibers, while composites containing 20 wt% of untreated fiber presented less than 10% of absorption (Figure 1). Stress tests showed that tensile strength was reduced with the increase of the fiber amount (Figure 2) according to Rozman [4].This result suggests a low efficiency of the chemical treatment related to PP matrix. Some Na ion vestige could remain on fiber surface that decreasing the resistivity results of the PP-Fiber composite (Table 1). Although the results of the properties have been lower than those obtained for the pure matrix, coconut fibers reinforced composites have applicability on electrical sector because the reduction on resistivity values is not harmful enough to this application.

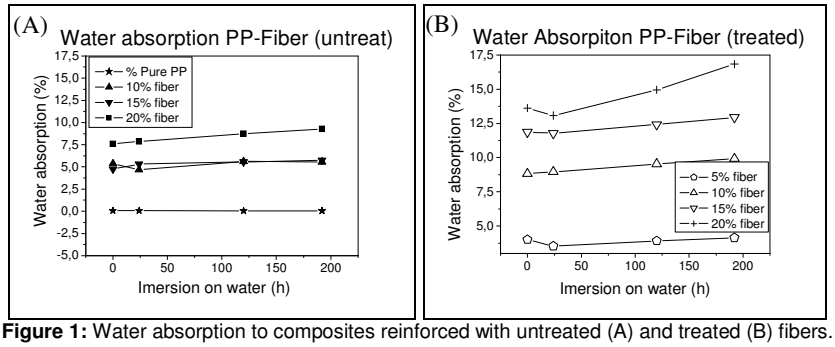

Figure 1: Water absorption to composites reinforced with untreated (A) and treated (B) fibers.

Table 1: Electrical resistivity, ρ to PP-Fiber composites.

Material	Fiber amount (%)	ρ (Ω.m) x 10^6
PP-Fiber untreated	5	21.10±3.17
	10	42.30±3.46
	15	19.20±1.28
	20	3.11±0.47
PP-Fiber treated	5	5.62±1.33
	10	11.01±1.77
	15	0.16±0.32
	20	0.02±0.01

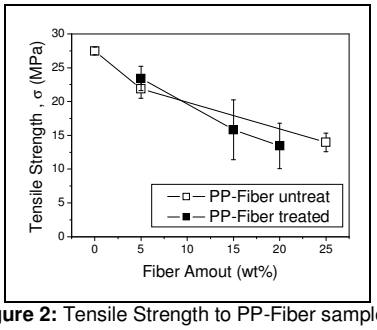

Figure 2: Tensile Strength to PP-Fiber samples.

References

[1] S. K. Garkhail, r. W. H. Heijenrath and t. Peijs, Applied Composite Materials 7 (2000) 351–372.
[2] A. Bismarck, A. K. Mohanty, I. S. Czapla, M. Misra, G. Hinrichsenb and J. Springera, Green Chemistry 3 (2001) 100–107.
[3] M. M. Rahman, M. A. Khan, Composites Science and Technology 67 (2007) 2369–2376.
[4] H. D Rozman, European Polymer Journal 36 (2000) 1483-1484.