

## MC-I-2

### PP-g-MAH COMPATIBILIZER CHARACTERISTICS ON MECHANICAL PROPERTIES OF GLASS FIBER-REINFORCED POLYPROPYLENE

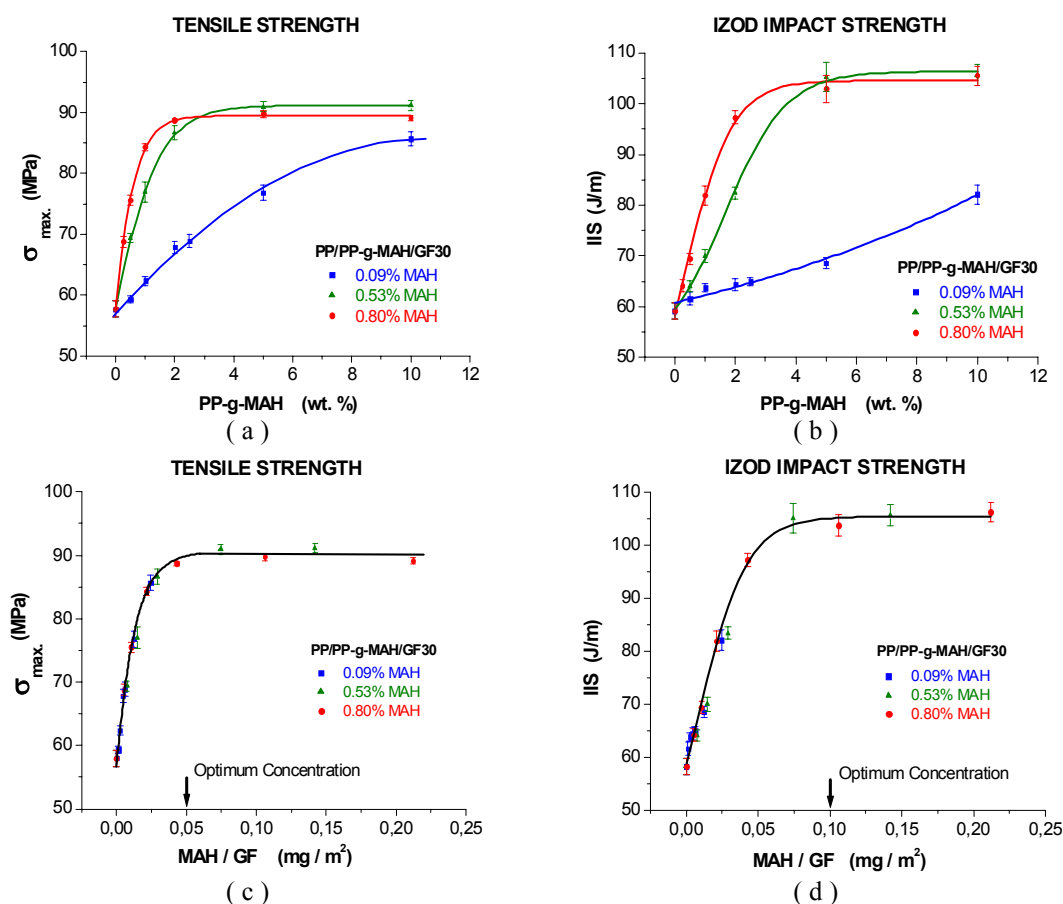
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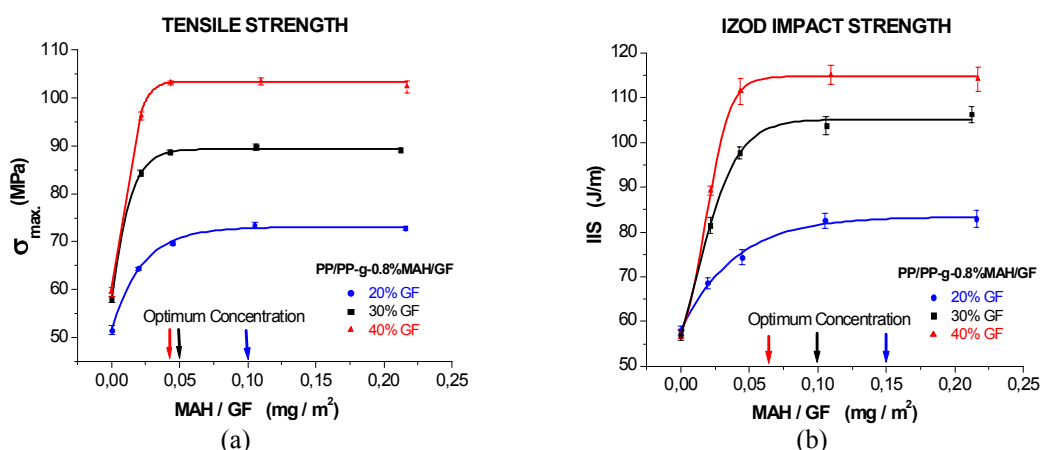
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In glass fiber (GF) reinforced polypropylene (PP) composites, the use of maleic-anhydride grafted PP (PP-g-MAH) as interfacial compatibilizer has been reported in literature. Although recent publications<sup>[1,2]</sup> have discussed the influence of the PP-g-MAH characteristics on the mechanical behaviour of PP/GF composites, many aspects related to the interfacial adhesion and nature of the composite interphase have yet to be elucidated. Therefore, using a model composite system of PP reinforced with aminosilane treated short GF of varying fiber content, the influence of MAH concentration and molecular weight (MW) of different grades of PP-g-MAH compatibilizer has been investigated in this work.



**Figure 1** - Tensile strength (a & c) and impact strength (b & d) of PP/PP-g-MAH/ GF30 composites (30% wt.GF) as a function of PP-g-MAH (a & b) and of MAH/GF concentration (c & d).

The compatibilizer efficiency in the fiber-reinforcement mechanism of these PP/PP-g-MAH/GF composites was determined as a function of maximum tensile (TS) and notched Izod impact strength (IIS) properties improvement achieved with minimum PP-g-MAH concentration. For a given grade of PP-g-MAH, increase in compatibilizer concentration leads to substantial increase in both the TS and IIS up to an optimum concentration, above which both properties tend to level off, and corresponds to a saturation level of the GF surface with the PP-g-siloxane copolymer formed at the interphase. However, a single master curve is obtained when all experimental data is presented as a function of the effective MAH concentration in the composite, indicating that the increase in the mechanical properties is essentially a function of reacted MAH concentration. Therefore, the simultaneous increase in both the TS and IIS with MAH concentration can be attributed to the high interfacial adhesion and a soft and ductile nature of the interphase.



**Figure 2** - Tensile strength (a) and notched Izod impact strength (b) as a function of the MAH ( $mg/m^2$ ) for PP/PP-g-0.8 % MAH/GF composites with 20, 30 and 40 % by weight of GF.

The optimum compatibilizer concentration ( $mg$  of MAH/ $m^2$  of GF surface area) at fiber-polymer interphase saturation point is reduced with increase in GF content, indicating that this optimum concentration is also dependent on the probability of the compatibilizer migrating to the GF surface, such that higher the GF content, higher will be the statistical probability of achieving interfacial compatibilization in the composite.

## REFERENCES:

1. - Lopes, P. E. and Sousa, J. A. - *Influence of PP-g-MAH Compatibilizer Characteristics on Interphase and Mechanical Properties of Glass Fiber Reinforced Polypropylene Composites*, Proc. 18<sup>th</sup> PPS Annual Meeting (CD-ROM), # 496 (9 pg), Guimarães - Portugal, June (2002).
2. - Roberts, D. H.; Constable, R. C. & Thiruvengada, S., *Polym. Eng. Sci.*, 37, 1421-1426 (1997).