ISSN 2181-3187

FILLED POLYMER COMPOSITES

PhD ***Abdukarimova S.A.***
Tashkent State Technical University
PhD ***Yodgorov N.N.***
Tashkent State Technical University
Senior Lecturer ***Makhkamova L.K.***
Tashkent State Technical University
Master student ***Yusupova G.B.***
Tashkent State Technical University

Abstract: Glass fibers do not act as an effective reinforcing material when the PP-g-MAH concentration is low. The effect of process parameters on the mechanical properties of composite manufactured specimens is discussed based on the results of tensile tests, three-point flexural tests, Izod impact tests, heat distortion temperature and melt index.

Keywords: glass fiber/ PP-g-MAH/polypropylene composites; adhesion; mechanical properties.

However, the new material carries the properties which cannot be achieved either of the content's sole performance. Basically, fibers are known as the fundamental load-carrying members, whereas the main functions of the matrix are as follows: transfer of stresses between the fibers, provision of barrier against environmental adverse effects and protection of surface of fiber from mechanical abrasion [1,2]. However, there is a crucial issue remaining in adjusting "well-bonded and durable interphases" and in their reinforcement. This adhesion restricts to "third phase" (often called as "interphase") where there occurs stress-transfer. At the same time, interphase is considered as the tridimensional region whose location takes part between fiber and polymer matrix. Therefore, this transition region carries its own unique characteristics corresponding to none of the fiber and matrix properties and it called as Materials [3].

A maleic anhydride-grafted polypropylene, PP-g-MA, (MEP PP-g-MAH, POLYMER PIGMENT LLC) was used as a compatibilizer. The chopped strand GFs of 13 micron in diameter and 4,5 mm length, respectively, with an adequate surface treatment intended for use in polypropylene matrices were provided by Shandong fiberglass -925ERC. Melt Processing composites were manufactured at an industrial scale using a co-rotating intermeshing twin-screw extruder (L/D 44) operating at a barrel temperature of 240˚C, a feed rate of 800 kg/h, and a screw speed of 600 rpm.

The results of tensile tests are reported in Table 2. Generally, for polymer composites, the percentage of elongation at break decreases with the addition of glass

ISSN 2181-3187

fiber to ductile polymer matrix, despite the state of the inter-face between different phases [4].

Table 1. Values of physical and mechanical properties or the composites.

Name	Standards						
Melt index, 2.16 kg/10 mi at 230^{0}C							
,							
P							
Notched Izod Impact Strength (23 ^{0}C) J/m^2			6	8		4	7
Notched Izod Impact Strength (-30 ^{0}C), J/m^2							
Heat Distortion Temperature (4.6 kgf/cm^2)							

However, the addition of the PP-g-MAH compatibilizer mitigates the negative effect of fiber reinforcement on the tensile elongation to some degree. It improves 2 to 6 % on average (Table 1).

Based on the aforementioned experimental results, the interfacial bonding between the glass fiber and PP matrix is improved by PP-g-MAH addition. This increase may explain the important role of the compatibilizer which makes the bonds between the macromolecular chains of PP and surfaces of fibers closely related and difficult to separate. Therefore, the impact absorbing capacity is increased and the material becomes more flexible[5] and will increase density from 0.88 to 1.35 gr/cm3 of PP+GF30 and PP+PP-g-MA+GF30 (FIG. 1) .

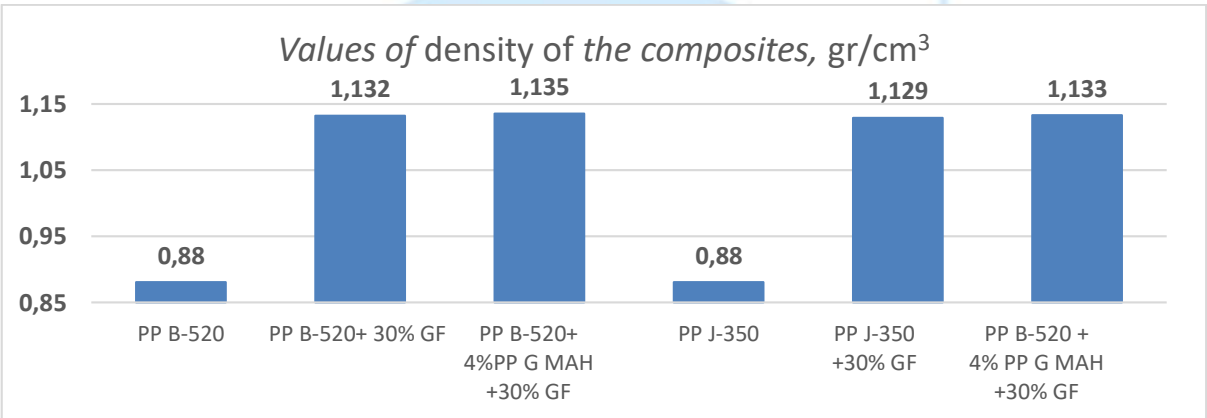

Figure 1. *Values of density of the composites, gr/cm3*

ISSN 2181-3187

Thermal Properties. The DSC results of composites are presented in Table 2 which lists thermal properties of base PP J350, PP+GF30, and PP+PP-g-MAH+GF30 composites. Here, it is worth noting that although the melting temperature of all composites did not change significantly with the addition of the PP-g-MAH compatibilizer compared to PP+GF30, the degree of crystallinity values decreased. It is significantly improved Melting point of composites. Indeed, the obtained results have shown that the interfacial adhesion was substantially improved when PP-g-MAH was added.

There was conducted an investigation on the effect of addition of maleic anhydride grafted polypropylene (PP-g-MAH) and glass fiber on the characteristics of polypropylene composite. The analysis of temperature, melt index and fiber orientation was carried out in accordance with the study of physical and mechanical properties. Furthermore, it was confirmed that, reinforced glass fiber along with PP-g-MA compatibilizer improves random or block polypropylene. It was acknowledged that, the mechanical properties of polymers improve with the addition of glass fiber and PP-g-MAH regardless of the nature of polypropylene

.

REFERENCES

1. A. Gullu, A. Ozdemir, and E. Ozdemir, Mater. Des., 27, 316 (2006).

2. L. Sorrentino, G. Simeoli, S. Iannace, and P. Russo, Com-pos. Part B: Eng., 76, 201 (2015).

3. J.L. Thomason, Compos. Sci. Technol., 61, 2007 (2001).

4. M.A. AlMaadeed, M. Ouederni, and P.N. Khanam, Mater. Des., 47, 725 (2013).

5. Y. Arao, S. Yumitori, H. Suzuki, T. Tanaka, k. Tanaka, and T.Katayama, Compos. Part A: Appl. Sci. Manuf., 55,19 (2013).