

USE OF SEM-EDX FOR THE CHEMICAL ANCHORING CHARACTERIZATION OF POLYPROPYLENE ONTO GLASSFIBERS

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The adhesion between matrix and fibers is an essential factor in determining the performance of thermoplastic-based polymer composite materials. The interfacial adhesion of the polypropylene (PP) and glass fibers (GF) could be highly improved by chemical anchoring between PP and GF. In this work, the reaction route proposed includes an initial contact with methylaluminoxane (MAO) and hydroxy- α -olefin to generate the anchorage points on the fiber surface, followed by a propylene polymerization catalyzed by $\text{EtInd}_2\text{ZrCl}_2$ (metallocene)/MAO.

In order to assess the chemical bonding between PP and GF, an experimental method based on selective extractions and a combination of scanning electron microscopy (SEM) with X-ray dispersive energy microanalysis (EDX) was used. Samples were etched with n -heptane at high temperature for extracting the polymer “physically” bonded to GF. Then, if polymer remains on fibers is chemically bonded. The samples treated in this way were measured by SEM/EDX and compared with pure GF. Different morphologies of polymers on fibers were observed and the typical carbon peak, absent in pure GF, appears.

The above analysis was corroborated by a second use of SEM directly on cryogenic fractures of composites prepared with the “polymerized fibers”. Typical debonding is observed in samples prepared with fibers without treatment and characteristic fracture lines from fibers, indicating good adhesion, are evident in composites prepared with “polymerized fibers”.