

Effect of Acid-Base Treatment of Silica on Interfacial Adhesion of Silica/Rubber Composites

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In this study, the influence of acid-base treatment of silicas on mechanical interfacial properties of the silica/ethylene propylene diene terpolymer (EPDM) composites was investigated. The surface characteristics of the silicas were observed by the surface energetics, pH, and acid-base values. And mechanical interfacial properties of the composites were evaluated by crosslink density and tearing energy. As an experimental result, the specific component of surface free energy of silica surfaces were increased by the acid treatment, resulting in decreasing the mechanical properties of the composites. However, basically treated silicas showed a higher value of the London dispersive component than that of the untreated and acidically treated silicas. It was also found that the dispersion of the silicas was advanced, ending in the improvement of the crosslink density and tearing energy of the composites. The results could be explained that the basic functional groups of silica surfaces by base treatments led to the increase of the interfacial adhesion by physical interaction between silicas and rubber.