## Abstract

Natural fibers are increasingly being used as composite reinforcement for both thermoplastic and thermoset resin, mainly for automotive application. Due to their hydrophilic nature, natural fibers have certain limitations during composite manufacture especially owing to their poor resin wettability, weak fiber–polymer interface, high moisture absorption, and being affected by high temperature in case of thermoplastic resin. This work investigates the impact of sisal fiber modification techniques on moisture absorption, thermal, and mechanical properties of the fiber. Four sisal fiber samples were prepared; untreated, alkaline treated, acetylated, and a combined alkaline-treated/acetylation samples. The samples were evaluated for their hygroscopic nature, thermal stability, and tensile properties. It is found that acetylation resulted in a reduction of moisture absorption of sisal fiber as the acetylated and alkaline-treated/acetylated samples recorded a decrease of 42% and 28%, respectively. Alkaline treatment increased the absorbency owing to the removal of hemicellulose and lignin. The thermogravimetric result revealed that alkaline treatment improved the thermal stability as the alkali-treated and alkali-treated/acetylated samples showed improvement in thermal properties. The acetylated sample resulted in a significant reduction in tensile strength. But, the results from tensile tests of the alkaline-treated samples showed an insignificant decrease in tensile strength and improvement in the modulus for all treated samples. Fourier-transform infrared and scanning electron microscopic analysis were included in the study to supplement the results with structural and microstructural changes. The effect of those treatments on the sisal–PET composite properties was studied and will be submitted in part 2 of the study.