

## Abstract

The aim of this work is to develop biocomposites based on modified sunflower oil as resin and short natural fibers from Alfa plants (*Stipa tenacissima*) as reinforcement. Epoxidized sunflower oil (ESFO) was chemically modified via acrylation reaction to obtain acrylated epoxidized sunflower oil resin (AESFO). The AESFO resin was then copolymerized with styrene as co-monomer in the presence of boron trifluoride ( $\text{BF}_3$ ) as cationic initiator and cobalt octoate (Co) as catalyst. Experimental conditions of this modification were optimized by varying styrene, Co and  $\text{BF}_3$  wt%. The styrene was varied from 30, 40 to 50 wt% while the catalyst (Co) was varied from 0, 0.01, 0.02 to 0.03 wt%. Two different percents of  $\text{BF}_3$  were considered: 0.5 and 1 wt%. The prepared samples were evaluated according to their appearance and then characterized in terms of tensile properties (stress at break, Young's modulus and elongation at break) to determine the best ratio of styrene/ $\text{BF}_3$ /Co. Alfa fibers, used as bio-reinforcement, were treated with a 5% NaOH solution and characterized by Fourier transform infrared (FTIR) spectroscopy, scanning electron microscopy (SEM) and thermo gravimetric analysis (TGA). Biocomposites were prepared by using untreated (UAF) and treated Alfa fibers (TAF) at a ratio of 5 wt% and characterized in terms of tensile properties and morphology by SEM. The best results were obtained with TAF. Then, the ratio of TAF was varied (5, 7.5 and 10 wt%) and the tensile and thermal properties of the biocomposites were characterized. The results showed that the best results were obtained with the ratio of 7.5 wt%.