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POLY(LACTIC ACID) /KENAF FIBER COMPOSITES: EFFECT OF MICRO-FIBRILLATED CELLULOSE ON INTERFACE-SENSITIVE PROPERTIES

Gordana Bogoeva-Gaceva[1], Dimko Dimeski[2], Vineta Srebrenkoska[2]

gordana@tmf.ukim.edu.mk

1-Faculty of Technology and Metallurgy, Ss Cyril and Methodius University, Rudjer Boskovic 16, 1000 Skopje, Macedonia

2-Goce Delcev University Stip, Macedonia

Ecologically friendly composites consist of a biodegradable matrix and natural fibers (such as cotton, sisal, kenaf, bamboo, etc.), which have been successfully used for reinforcing of different polymer matrices. Quite recently, poly(lactic acid) (PLA) was used as a matrix for biodegradable eco-composites.

Natural fibers (NFs) offer both cost savings and a reduction in density when compared to glass fibers. Though the strength of NFs is not as great as glass, the specific properties are comparable.

One of the most undesirable properties of NFs is their dimensional instability due to the swelling caused by moisture absorption. However, a strong fiber/matrix interfacial adhesion can help to diminish the water penetration, avoiding the worsening of mechanical performances of composites exposed to humid conditions.

According to the literature, kenaf fibers exhibit higher strength values in terms of tensile and flexural properties, as compared to other NFs, when reinforcing PLA.

The aim of this work was to study the mechanical behavior of PLLA-based composites reinforced with kenaf fibers, and the influence of micro-fibrillated cellulose (MFC) on overall composite properties.

Composites of PLLA and kenaf fibers were prepared by melt mixing the components in a Rheocord apparatus, and consequent compression molding at 180 ^{o}C for 3 min at 50 MPa. The amount of MFC in the mixture was varied from 5-15 %, while the content of PLLA was kept constant, 50%.

The results have shown that the addition of MFC influence the interface sensitive properties of PLLA/kenaf fiber composites, increasing the interfacial energy release rate for about 20% at MFC loading of 10%. Flexural strength and modulus of the composites were also improved by the presence of MFC, reaching values of 57 MPa and 5.9 GPa, corresondingly.

Key words: kenaf fiber composites; biodegradable matrix; natural fibers; micro-fibrillated cellulose; interface-sensitive properties.