Recycling and reuse of eco-composites

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Eco-composite engineering materials are contributing remarkably to the technological
development of the world, both to the numerous benefits of the human society as well as
to the solid-waste disposal problem. Related to this, waste legislation are influencing the
composite industry, such as EU directives, End of Life Vehicles (ELV) and Waste
Electrical and Electronic Equipment (WEEE), and that will put more pressure on solving
fiber-reinforced composite waste management through recycling and reuse.
In the frame of this study, recycling and reuse facilities of eco-composites based on
agricultural waste (AW) and thermoplastic recyclable polymer matrix (TPP), developed
in the framework of ECO-PCCM project [http://elchem.ihtm.bg.ac.yu/ECO-PCCM/],
have been analyzed. Eco-composites have been prepared based on reused and several
times recycled polymer matrices, as well as based on several times recycled AW/TP
composites. Fabrication of eco-composites has been performed by conventional
techniques, such as extrusion and compression molding, and their characterization
protocol include analysis of mechanical behavior (tensile test, flexural test, impact
resistance), thermal stability (by TGA) and morphological analysis (by SEM).
The obtained results for the studied composites with reuse recycled polymer matrix as
well as based on the recycled fiber-reinforced composites, have shown increased modulus,
both tensile and flexural, from 12 to 32 %. Tensile and flexural strength were slightly
decreased. SEM analysis has shown that the AW fillers are covered by the recycled
polymer matrix, indicated on the satisfied durability of the recycled polymer matrices.

Fig. 1. SEM of TPPx1/AW/CA (x100)  Fig. 2. SEM of TPPx2/AW/CA (x200)