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Composites based on PHA and natural Fibres from agricultural waste for different application

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The world petro-plastic production reached ca. 335 million tons (Mt) in 2016 and it is expected to double again over the next 20 years. To reduce the problem of recycling of petro-based plastics and minimize their environmental impact, research efforts are rising in the field of bioplastics (BP) around the world. Petrol plastic wastes accumulation in natural environments is raising and generating the interest for new materials with high sustainability, biodegradability and relevant performances. In this contest bio-composites produced with biodegradable, bio-based polymeric matrices and fibres of natural origin derived from by-products or over production are one of the most important categories of material that is being proposed on the market. In the present abstract we report our contribute to knowledge and advancement in research on biobased composites in particular produced with biopolymers such as polyhydroxyalkanoates (PHAs), biodegradable in different environments, with natural fibres from agro-food industrial waste (potatoes, beet, bran, legume fibres) and cellulosic fibres (sawdust). Composites based on PHAs and the natural fibres were produced by extrusion in presence of appropriate amounts of plasticizer and inorganic fillers. Thermal, rheological, mechanical and morphological characterizations of the developed composites were conducted. In order to deepen the study on bio composites properties, different predictive models (Cox, Curtis and Pukanszky) were applied to evaluate how the mechanical performance varies with the fibres load. Considering that PHAs present a secondary crystallization with consequent change of mechanical properties, an ageing study of the developed composites was carried out by monitoring the properties of tensile specimens over time.

Recent Publications:

1. New bio-composites based on Polyhydroxyalkanoates and *Posidonia oceanica* fibres for applications in marine environment. M. Seggiani, P. Cinelli, N. Mallegni, E. Balestri, M. Puccini, S. Vitolo, C. Lardicci, A. Lazzeri. Materials 2017, 10, 326-338.
2. Degradability and Sustainability of Nanocomposites Based on Polylactid Acid and Chitin Nano Fibrils", P. Cinelli, M.B., Coltelli, N. Mallegni, P. Morganti, A. Lazzeri. Chemical Engineering Transactions, 2017, 60
3. Poly(lactic acid) (PLA) based tear resistant and biodegradable flexible films by blown film extrusion. N. Mallegni, T. Vu Phuong, M.B. Coltelli, P. Cinelli, A. Lazzeri. Accepted Materials.

Biography

Norma Mallegni postdoc in University of Pisa, Department of Civil and Industrial Engineering, Master Degree in Chemistry, is working on copolymerization, blending and processing of biobased polymers for tuning properties and sustainability of biobased materials.

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