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Characterization of wood plastic composites manufactured from recycled plastic blends.

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Abstract

The possibility of using recycled plastic waste for the manufacturing of wood-plastic composites is investigated. The samples were processed from the “light” fraction of construction plastic waste and municipal mixed plastic waste, and tested for flexural, tensile, and un-notched impact strength, hardness properties and water absorption. Thermal analysis was performed by differential scan calorimetry and thermogravimetric analysis methods; scan electron microscopy was used for morphology study of the composites. It was found that the strength of the composites was poorer than those of the reference manufactured from virgin low density polyethylene; the hardness was comparable and stiffness higher than those of the reference. The wettability of the reference was the lowest of the studied composites.

Key words: plastic recycling; wood plastic composites; mechanical properties; thermal properties;

1. Introduction

Construction and demolition waste (CDW) is one of the heaviest and most voluminous waste streams generated in the EU [1]. This waste consists of various materials, including concrete, bricks, gypsum, wood, glass, metals, plastic, and others, many of which can be recycled. According to the EU strategy, a minimum of 70% of non-hazardous CDW must be prepared for re-use or recycling by 2020 [2]. More effective waste management, particularly increasing the recycling rate, can reduce greenhouse gas emissions, save raw materials and energy, as well as create new economic activities and jobs [3]. Thus, the EU community has strong needs and motivation to prevent waste disposal to landfill and to look for new recycling projects and technologies. The opportunities of using CDWs as aggregates in concrete [4] and fillers in wood plastic composites [5,6] have been studied.

According to statistics, the biggest plastic waste outlets in Europe, e.g. in the UK, are commercial and household packaging, approx. 58% of total plastic waste, followed by the building and construction sector, approx. 10% [7]. Construction plastic waste can contain packaging as well as non-packaging

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