Effect of waste rubber powder as filler for plywood application

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Abstract

The study investigated the suitability of waste rubber powder (WRP) use as fi ller in adhesive formulation for plywood application. Melamine Urea Formaldehyde (MUF) was employed as resin for formulating the wood adhesive. To improve chemical properties and bonding quality of adhesive, WRP was treated by different chemicals like 20% nitric acid, 30% hydrogen peroxide and acetone solution. The treated WRP were analysed by XRD and it showed that inorganic compounds were removed and carbon was remained as major component under the treatment of 20% HNO3. The treatment improved the mechanical properties like shear strength and formaldehyde emission of plywood (high shear strength and low formaldehyde emission). The physico-chemical interaction between the wood, resin and filler was investigated using fourier transform infrared spectroscopic (FTIR) technique and the interactions among N-H of MUF and C=O of wood and WRP were identified. The morphology of wood-adhesive interface was studied by field emission scanning electron microscope (FESEM) and light microscope (LM). It showed that the penetration of adhesives and fillers through the wood pores was responsible for mechanical interlocking. Therefore, chemically treated WRP proved its potential use as fi ller in MUF based adhesive for making plywood.

Keywords: waste rubber powder, melamine urea formaldehyde resin, filler, wood adhesive, plywood

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