

## **Thermal and Mechanical Properties of Ureaformaldehyde (Uf) Resin Combined With Multiwalled Carbon Nanotubes (MWCNT) as Nanofiller and Fiberboards Prepared By UF-MWCNT**

**Anuj Kumar<sup>a</sup>, Arun Gupta<sup>b</sup> and Korada Viswanathan Sharma<sup>c</sup>**

<sup>a</sup>Faculty of Civil Engineering, Department of Building Structures, Th a kurova 7, 166 29 Praha 6, Czech Republic

<sup>b</sup>Faculty of Chemical and Natural Resources Engineering, University Malaysia Pahang, Gambang, Kuantan, 26300 Pahang, Malaysia

<sup>c</sup>Department of Mechanical Engineering, Universiti Technology PETRONAS, Bandar Seri Iskandar, 31750, Tronoh, Perak, Malaysia

### **ABSTRACT**

The effect of multiwalled carbon nanotubes (MWCNT) as reinforcement on the properties of urea-formaldehyde (UF) resin and medium-density fiberboards was investigated. MWCNT was added to UF in two concentrations, and the effects were studied by means of differential scanning calorimetry and dynamic mechanical thermal analysis in terms of the curing and viscoelastic properties of the resins. In the presence of MWCNT, the activation energy of the resins was lowered, and their storage modulus and thermal conductivity were enhanced. The formaldehyde emission decreased and mechanical properties increased after addition of MWCNT to UF resin.

**KEYWORDS:** curing behavior, fiberboard, formaldehyde emission, mechanical properties, multiwalled carbon nanotubes (MWCNT), thermosetting resin, urea-formaldehyde resin, wood composites

**DOI: 10.1515/hf-2014-0038**