

Modification Of Pristine Nanoclay And Its Application In Wood-Plastic Composite

Sumit Manohar Yadav¹, Kamal Bin Yusoh¹

¹Faculty of Chemical Engineering and Natural Resources Engineering, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 23600 Kuantan Pahang, Malaysia

ABSTRACT

The modification of pristine nanoclay and its application in wood plastic composite (WPC) have been investigated in this paper. Pristine nanoclay was modified using transition metal ion (TMI) which was copper (II) chloride to achieve good dispersion and to improve properties of WPC. The morphology, composition, structure, and thermal stability of TMI-modified nanoclay were studied by field emission scanning electron microscopy (FESEM), energy dispersive X-ray analysis (EDX), X-ray diffraction (XRD) and thermogravimetric analysis (TGA) analysis. The pristine (WPC/MMT) and TMI-modified (WPC/MMT Cu) nanoclay based WPC were made from polypropylene (PP), wood flour (WF), and maleic anhydride grafted polypropylene (MAPP) coupling agent. Pristine and modified nanoclay with different concentration (1 wt%, 2.5 wt%, 4 wt% and 5 wt%) were used as a reinforcing filler for WPC. Mechanical, physical, morphological, and thermal properties of the prepared composites were evaluated. Result exhibit that at 1 wt% nanoclay content, the tensile, flexural, and impact strength of WPC/MMT improved by approximately 6%, 4%, and 8%, respectively, compared to WPC without nanoclay. For the WPC/MMT Cu, the improvements in these properties were about 2.6, 2.1 and 3 times higher than the WPC/MMT. The physical and thermal properties also improved by incorporating modified nanoclay in WPC.

KEYWORDS: mechanical properties; modification; nanoclay; thermal properties; wood polymer composite

DOI: [10.1515/epoly-2016-0217](https://doi.org/10.1515/epoly-2016-0217)