

Coconut Shell Particle Reinforced Al-Cu-Mg Nanocomposites for Cavity Die Mould Parts Applications

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Abstract. This study explored coconut shells in developing Al-Cu-Mg based nanocomposites for fabricating mould parts. The aim is to engineer alternate way through which income can be generated from agricultural wastes and recycling of industrial waste like aluminium cans. Al-Cu-Mg based nanocomposites were produced and characterised. Effects of carbonised and uncarbonised coconut shell nanoparticle (UCSNP) additions on properties of Al-Cu-Mg nanocomposites were compared. Maximum tensile strength was obtained at 10%vol uncarbonised coconut shell nanoparticle additions to Al-Cu-Mg. Increase in tensile strength and elastic modulus were noted with carbonised coconut shell reinforced Al-Cu-Mg nanocomposites against the decrease in the elastic (Young's) modulus of the UCSNP/Al-Cu-Mg nanocomposites. Despite highest tensile strength of 10%volUCSNP/Al-Cu-Mg, 10%volCCSNP/Al-Cu-Mg nanocomposite is ranked as the best material in this study due to its optimum combination of properties including tensile strength, elastic modulus, tensile strain, impact energy and hardness values. Hence, it has been selected for fabricating open die mould parts to be used in compression sheet forming process for fabricating polymeric standard samples for tensile flexural analyses.