

Effect of Surface Treatment of Red Mud on Interfacial Properties of Epoxy Matrix Nanocomposites

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To improve the mechanical properties and thermal stability of epoxy resin, the red mud (RM) used as a filler was chemically treated by 0.5, 1, and 1.5 N HCl solution. The effect of chemical treatment on RM surfaces was studied in terms of pH and acid-base values. Also, the mechanical interfacial properties and thermal stabilities of RM/epoxy nanocomposites were examined by critical stress intensity factor (K_{IC}), dynamic mechanical analysis (DMA), thermogravimetric analysis (TGA), and coefficient of thermal expansion (CTE). From the results, the K_{IC}, storage modulus, and thermal stability of the nanocomposites were higher than pure epoxy resin. Moreover, the CTE of RM/epoxy nanocomposites were lower than pure epoxy resin. All the results could be contributed to the increased acidic functional groups on RM surfaces, which increased interfacial interaction between epoxy matrix and acidic RM surfaces.