Graphene Oxide-Based Nanofluid for Heat Transfer Applications

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This research investigates the performance of Graphene Oxide-Deionized Water (GO-DI water) nanofluid, and partially reduced Graphene Oxide-Deionized water (prGODI water) nanofluid for enhanced heat transfer efficiency. GO and prGO were derived from Sri Lankan graphite via the modified hummers method followed by thermal reduction in a tube furnace. The effect of particle loading was analyzed on the viscosity, thermal conductivity (TC) and stability of nanofluid. The results show that the nanofluids beyond mass loading of 0.5 wt% of GO/prGO show poor stability. prGO was found to be more effective in enhancing the TC of the nanofluid, due to the enhanced TC of the prGO particles. TC enhancement of nanofluids up to 30% was achieved, with the highest increment shown by the nanofluid with 0.75 wt% prGO. Furthermore, the thermal transport characteristics of the nanofluids were computationally modelled using finite element analysis. The average convection heat transfer coefficient (CHC) of 0.5 wt% prGO-based nanofluid showed a 52% increment, highlighting the effectiveness of prGO-based nanofluids. Importantly, the nanofluids with particle concentrations below 0.5 wt% show performance enhancement ratio (PER) values suitable for practical applications. The outcome of this research shows the potential of GO-based nanofluids as state-of-the-art heat transfer fluids to be used in the coolant industry.

Keywords: *Graphene Oxide, Nano Fluid, Thermal Conductivity, Convection Heat Transfer, Stability, Viscosity.*