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INVESTIGATING OF MECHANICAL PROPERTIES OF EPOXY-ALUMINA NANOCOMPOSITES

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At present paper, a systematic study has been developed to investigate epoxy matrix nanocomposite performance due to incorporating nanosize Al₂O₃ particles. During the past decade, nanocomposites have become a new class of materials that improve composite material performance by accessing new properties and employing unique interaction between materials. Such reinforcement often offers synergistic improvement in properties when the component sizes approach the nano scale. In recent years there are great interest in improving properties of epoxy matrix composite due to incorporation of nanosize particles such as TiO₂, SiO₂ and etc. This was found to be a more effective way of improving the mechanical and thermal properties of thermoset polymers over the traditionally used micrometer size fillers. In order to homogenous dispersion of nano particles into epoxy resin, ultrasonic mixing process was employed. Several mechanical testing such as three point bending test, Izod impact test, shore D hardness and pin on ring wear test were employed to investigate mechanical properties and wear performance of epoxy-Al₂O₃ nanocomposites. nanocomposites show increasing in bending strength and impact strength due to incorporating Al₂O₃ nano particles. In addition, introducing nano-Al₂O₃ particles into epoxy resin matrix at low content causes significant reduction in wear rate and coefficient friction. Such effects can be explained by dispersion of nano-Al₂O₃ into epoxy matrix and loading. In order to explain these effects in term of reinforcing mechanism several reason were discussed. The final properties of nanocomposites may open the way towards new application of high performance polymers such as industrial flooring, laboratory flooring and many other application.