The Effect of TiO$_2$ Filler Content on the Mechanical, Thermal, and Tribological Properties of TiO$_2$/PPS Composites

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In an attempt to overcome existing limited studies about the residual flexural properties of solid particle eroded particle reinforced thermoplastic composites, this study is aimed to determine particularly titanium dioxide (TiO$_2$) particle concentrations (0, 5, 10, 15, 20, and 25 wt %) effects on the flexural and solid particle erosive wear properties of TiO$_2$ particle reinforced polyphenylenesulphide (PPS) composites. In addition, thermal and viscoelastic properties of PPS composites were also studied by using Dynamic Mechanical Analysis (DMA) and Thermogravimetric Analysis (TGA) methods. TiO$_2$ reinforced PPS composite samples were prepared by using a twin screw extruder and injection molding machines. Subsequently, composite samples were eroded under various impingement angles in specially designed erosion test rig by using silica particles and then flexural tests were performed. It was found that increase of particle concentrations in PPS improves composite's stiffness. Besides, maximum flexural and residual flexural strength were obtained at 10 wt % particle concentrations for both uneroded and eroded composites. The erosion rate of composite was increased with augmentation in TiO$_2$ concentration. Moreover, TGA analysis indicated that remarkable results on thermal stability were obtained. The effects of TiO$_2$ reinforcement on the results of DMA were also discussed.

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