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Prediction of Mechanical Properties for Polyetheretherketone Composite Reinforced with Graphene and Titanium Powder using Artificial Neural Network.

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Abstract

High performance Polyetheretherketone (PEEK) hybrid composite were synthesized by reinforcing different wt% of Graphene (C) and Titanium powder (Ti) using Injection molding for applications such as compressor plate valves, piston parts, impeller wheels for regenerative pumps, shock absorber bearings, gears for oil and gas companies, cams, ball bearing cages aircraft exterior parts. For modeling and prediction of mechanical properties of PEEK/C/Ti composite, a multi layer perceptron feed forward neural network was constructed using input vectors as wt% of PEEK and reinforcements. Hardness, Tensile strength, Tensile elongation, and Modulus of elasticity are output vectors for polymer composite. The proposed ANN model for PEEK composites delivers satisfactory results in comparison to experimental measurements. The correlation factor connected with training and test dataset was greater than 0.9. 3-D plots for the predicted mechanical properties as a function of material compositions were established.

Keywords:

Polyetheretherketone, Graphene, Polymer composite, Artificial Neural Network, Mechanical properties

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