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MODELING THE THERMAL STABILITY OF THE POLYDIMETHYLSILOXANES/SILICA GREEN COMPOSITES USING NEURAL NETWORKS

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Abstract

This paper presents the development of artificial neural models for predicting the thermal stability of some polysiloxanes/silica composites obtained using an ecological solvent-free reaction. Four polydimethylsiloxane-α,ω-diols with different molar masses have been prepared and reinforced with different contents of silica generated in situ by sol-gel technique. The resulted materials were investigated by thermogravimetric analysis (TGA). In neural modeling, the thermal stability of the polysiloxanes/silica composites was quantified by two temperatures (the initial temperatures of thermal degradation and the temperature corresponding to the maximum degradation rate), as function of reaction conditions: molecular mass of polydimethylsiloxane, concentration of the catalyst and ratio between the reagents. Two feed-forward neural networks were developed and tested, demonstrating the possibility of obtaining accurate results with relatively simple architecture of the networks.

Key words: composites, feed-forward neural networks, polysiloxanes, silica, thermal stability

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