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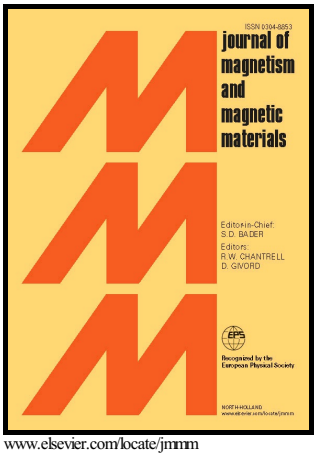

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Modeling and Prediction of Retardance in Citric Acid Coated Ferrofluid Using Artificial Neural Network

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Abstract

Citric acid coated (citrate-stabilized) magnetite (Fe_3O_4) magnetic nanoparticles have been conducted and applied in the biomedical fields. Using Taguchi-based measured retardances as the training data, an artificial neural network (ANN) model was developed for the prediction of retardance in citric acid (CA) coated ferrofluid (FF). According to the ANN simulation results in the training stage, the correlation coefficient between predicted retardances and measured retardances was found to be as high as 0.9999998. Based on the well-trained ANN model, the predicted retardance at excellent program from Taguchi method showed less error of 2.17% compared with a multiple regression (MR) analysis of statistical significance. Meanwhile, the parameter analysis at excellent program by the ANN model had the guiding significance to find out a possible program for the maximum retardance. It was concluded that the proposed ANN model had high ability for the prediction of retardance in CA coated FF.

Keywords: Artificial Neural Network; Ferrofluid; Multiple Regression; Retardance; Taguchi Method.

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