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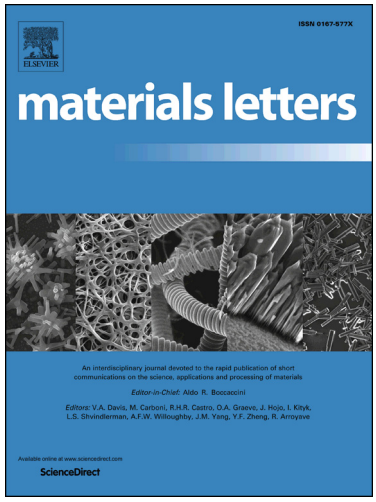

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Artificial Neural Network Enabled Capacitance Prediction for Carbon-Based Supercapacitors

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Abstract

Carbon is the most widely used electrode for the supercapacitors. This work applies the artificial neural network (ANN) technology to predict the capacitance of carbon-based supercapacitors. For training the ANN model, we extracted data from hundreds of published papers. Moreover, five features were selected to figure out their impact on capacitance, including specific surface area, calculated pore size, I_D/I_G ratio, N-doping level and voltage window. Then, several carbon-based samples were chosen to evaluate the performance of ANN. As the result, comparing to other machine learning methods, such as linear regression and Lasso, ANN exhibits the best accuracy and adaptability in the capacitance predication.

Keywords: Supercapacitors; Carbon materials; Energy storage and conversion; Simulation and modelling; Artificial neural network

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