

Solar harvesting via transparent thin films of porphyrin compounds for photothermal and photovoltaic dual modality building skins

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ABSTRACT: The aim of this work was to determine best linear model Adaptive Neuro-Fuzzy Inference System (ANFIS) and Sensitivity Analysis in order to predict the energy consumption for land leveling. In this research effects of various soil properties such as Embankment Volume, Soil Compressibility Factor, Specific Gravity, Moisture Content, Slope, Sand Percent, and Soil Swelling Index in energy consumption were investigated. The study was consisted of 90 samples were collected from 3 different regions. The grid size was set 20 m in 20 m (20*20) from a farmland in Karaj province of Iran. The values of RMSE and R2 derived by ICA-ANN model were, to Labor Energy (0.0146 and 0.9987), Fuel energy (0.0322 and 0.9975), Total Machinery Cost (0.0248 and 0.9963), Total Machinery Energy (0.0161 and 0.9987) respectively, while these parameters for multivariate regression model were, to Labor Energy (0.1394 and 0.9008), Fuel energy (0.1514 and 0.8913),

Total Machinery Cost (TMC) (0.1492 and 0.9128), Total Machinery Energy (0.1378 and 0.9103).Respectively, while these parameters for ANN model were, to Labor Energy (0.0159 and 0.9990), Fuel energy (0.0206 and 0.9983), Total Machinery Cost (0.0287 and 0.9966), Total Machinery Energy (0.0157 and 0.9990) respectively, while these parameters for Sensitivity analysis model were, to Labor Energy (0.1899 and 0.8631), Fuel energy (0.8562 and 0.0206), Total Machinery Cost (0.1946 and 0.8581), Total Machinery Energy (0.1892 and 0.8437) respectively, respectively, while these parameters for ANFIS model were, to Labor Energy (0.0159 and 0.9990), Fuel energy (0.0206 and 0.9983), Total Machinery Cost (0.0287 and 0.9966), Total Machinery Energy (0.0157 and 0.9990) respectively, Results showed that ICA_ANN with seven neurons in hidden layer had better. Biography

Biography

Professor Donglu Shi is the chair of the Materials Science and Engineering program at the College of Engineering and Applied Science, University of Cincinnati. His research deals with the design of nanostructures for fundamental new properties and novel applications in energy and biomedicine. He is a Fellow of ASM International and the Editor in Chief of Nano LIFE. Dr. Donglu Shi has published 300 refereed Journal papers with a Google Scholar h-index of 63.

Recent Publications

1. Lyu M Y, Lin J., Krupczak J. Jr., Shi D. (2020), Light angle dependence of photothermal properties in oxide and porphyrin thin films for energy-efficient window applications, MRS Communications, doi:10.1557/mrc.2020.39
2. Zhao Y, Dunn A, Shi D, (2019) Effective reduction of building heat loss without insulation materials via the photothermal effect of a chlorophyll thin film coated "Green Window, MRS Communications: Volume 9, Issue 2, 675-681
3. Zhao Y, Sadat M E, Dunn A, Xu H, Chen C H, Nakasuga W, Ewing R C, Shi D, (2017) Photothermal effect on Fe₃O₄ nanoparticles irradiated by white-light for energy-efficient window applications, Solar Energy Materials & Solar Cells 161, 247-254

Citation: Jou Lin, Donglu Shi, Solar harvesting via transparent thin films of porphyrin compounds for photothermal and photovoltaic dual modality building skins

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