Prediction and Optimization of Thermophysical Properties of Hybrid Cellulose Nanocrystal-Copper (II) Oxide Nanolubricant for Tribology Application

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Abstract Response surface methodology (RSM) was used in conjunction with the miscellaneous design model to identify prediction models for the thermophysical properties of a hybrid cellulose nanocrystal-copper (II) oxide nanolubricant. Minitab 18 statistical analysis software and Response Surface Methodology (RSM) based on Central Composite Design (CCD) were utilised to generate an empirical mathematical model investigating the effect of concentration and temperature. Analysis of variance (ANOVA) is used to validate the significance of the developed empirical mathematical model. Thirteen experiments were conducted to obtain second-order polynomial equations for the desired specific heat capacity, thermal conductivity, and dynamic viscosity, outputs. The predicted values were found to be in reasonable agreement following the investigational finding. In addition, the models could predict more than 80% of the nanolubricant output variations, indicating that the

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