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(57) Abstract :

The present invention relates to a novel multi-model method (202) and system of estimation of ash yield in coal using mid-infrared Fourier transform infrared spectroscopy. The ash yield in coal may be assessed and predicted using a multi-model regression approach that inputs mid-infrared FTIR spectroscopic data. The area under the curve (AUC) of fourteen selective absorption bands, sensitive to the ash yield in coal in the range of 1450-350 cm⁻¹ primarily associated with quartz, calcite, gypsum, anhydrite, and kaolinite was identified using the mid-infrared spectra analysis of coal and coal ash. These parameters may help aid in estimating and predicting the ash yield in coal using machine learning techniques. Machine learning algorithms including piecewise linear regression (PLR), artificial neural networks (ANN), partial least squares regression (PLSR), support vector regression (SVR), and random forest (RF) may be used to predict the ash yield in coal. A multi-model estimation (MME) method employing the average of PLR, PLSR, and ANN models demonstrates significantly lower residual values with predicted values very close to the observed values offering a robust and adaptable tool for rapid ash yield determination in coal from global basins. [figure 1]

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