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Treatment of Coal-Water-Oil Slurry Using High Voltage Discharge and Dielectric Barrier Discharge Plasmas

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Abstract : We converted the coal-water-oil slurry (CWOS) into an alternative fuel (AF) for internal combustion engines by high-voltage discharge (HVD) and dielectric barrier discharge (DBD) plasmas. After its treatments, the CWOS had the average coal size reduced from 12.95 to 8.26, improved dispersibility, fewer deposits, and calorific value enhanced by 35%. The effects of some parameters were analyzed on the conversion of CWOS to AF, and the AF was characterized. The plasma-treated CWOS is similar to other liquid fuels in rheological properties and calorific value. It is therefore concluded that it can be directly employed in internal combustion engines with a little design modification. The suggested method may be an alternative way of converting CWOS to AF without any dispersant or stabilizer.

Keywords : coal-water-oil slurry, high-voltage discharge, dielectric barrier discharge, plasma treatment, alternative fuel
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