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## Reaction-free evaluation of oil shale semicoke with terahetz domain spectroscopy

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Oil shale is widely viewed as important supplementary resource for petroleum. The quality of oil shale from certain region is conventionally assessed with maximum oil yield by Fischer Assay while the results may be different due to specific pyrolysis conditions. To determine utmost oil yield using non-chemical method is free from reaction interference and time-saving. In this study, we applied different combinations of pyrolysis temperature, heating rate and ventilating rate to process pulverized oil shale from Longkou, China so as to reserve various amount of organic matter. During pyrolysis, covalent bonds within kerogen of oil shale were subject to damage and thus shale oil and gas with light molecular weight formed. However, pyrolysis temperature was not sufficient to change inorganic mineral matrix. Therefore, the remaining organic matter of semicoke was distinct while the mineral matrix was alike. All of semicoke was compacted under same conditions to meet requirement of following optical experiments. Terahertz time domain spectroscopy was employed to detect semicoke tablets. According to the absorption of semicoke to terahertz wave, it was found that the transition of yield-condition dependence was in consistent with absorption-condition dependence. We had analyzed influence of pyrolysis temperature, heating rate and ventilating rate to Fischer Assay. Briefly, it turned out that rise of pyrolysis spanning from 400°C to 550°C facilitate shale oil production. Besides, optimal values were found for heating rate as well as ventilating rate at 15°C/min and 0.6 L/min, respectively. Such a transition for oil yield was related to secondary cracking, which was verified by data on pyrolysis products. As organic matter own distinct response to terahertz wave, the artificial maturation process can be characterized with optical parameter in terahertz range and this feature allows for the chance that optimization of pyrolysis efficiency based on terahertz time domain spectroscopy.

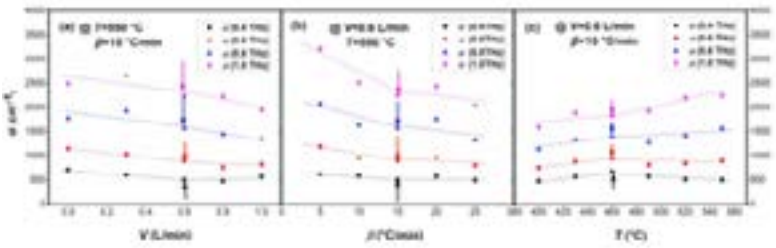

**Figure:** Terahetz Spectroscope of Oil-Shale semicoke

### Biography

Yizhang Li was graduated from Tianjin University in 2013 and is currently a Doctoral candidate in China University of Petroleum, Beijing, China. He has done his Master's in Material Science and Engineering and focuses on characterizing oil shale with optical measurement.

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