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In situ gasification of coal, a natural example: micropetrography of coal carbonisation and combustion

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Within the framework of phase A of the **Sino-German Research Initiative** lead-managed by DLR (German Aerospace Centre) micropetrographical and fuel chemistry investigations were applied aiming at an investigation of spontaneous combustion of coals at various coal fire zones detected within a number of proliferous coalfields of Inner Mongolia (Wuda, Gulaben, Rujigou, ShiZiaShan), North China. The Permo-Carboniferous coals account in Northern China for nearly 44.45 % of total Chinese coal resources contributing to a vast potential of fossil energy resources in the region. A thorough application of micropetrographical and fuel chemistry examinations may provide a firm ground for geological uncertainty and risk assessment impacting upon coal resource estimation, reserve forecasts and long-term planning Thermally altered high rank coals have been observed in high volatile-bituminous coal and semi-anthracite seams. Rank changes in coal fire zone 8, coalfield Wuda have been measured over a strike distance of several meters ranging from 0.93% Rr to 1.69% Rr. The performed investigations revealed a number of strongly differentiated coal quality parameters in addition to the presence of distinctive and combustion related parameters. These involve coal rank, volatile matter and total moisture content, calorific value and total sulphur content.

A number of semi-quantitative combustion related parameters include thermal shrinkage cracks, micro-degassing pores and coke content. With aid of the light and fluorescence microscopy micropetrographic characteristics of thermally influenced macer-

als indicate ongoing processes of oxidation, carbonisation and combustion associated with loss of volatile matter, decrease in liptinite content, cracking into small fragments, homogenisation, liquefaction of surrounding macerals, rounded cavities, coating with “tar-like” material, “ghost-like” appearance. These analyses formed an integral part of investigations of the self-ignition behaviour in coals as well as played an important part in the experimental investigations of the coal fire propagation conducted at BAM (Federal Institute for Materials Research and Testing) and GGA (Leibniz Institute for Applied Geosciences).