Fluid properties in porphyry-style to skarn-hosted copper mineralization at Dongguashan, SE China

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The giant magmatic-hydrothermal deposit of Dongguashan in Tongling, Southeastern China, was studied as a typical case for understanding the extensive gold-copper mineralization along the middle-lower reach of the Yangtze River. Previous research on this deposit was followed by debates concerning the source and enrichment of ore metals [1-4] due to inadequate constraints for the ore-forming fluids based on inclusion microthermometry [5]. We are combining physicochemical estimations with trace element compositions of successive fluid inclusion assemblages to gain a better insight into the history of ore formation.

The sedimentary country rocks have contrasting compositions from Late Devonian sandstone to Carboniferous, Permian and Triassic carbonate rocks. When they were intruded by Early Cretaceous I-type calc-alkaline quartz diorite (~140 Ma), porphyry-style mineralization occurred at the bottom while strata-bound skarn type developed on top, including the layered main ore body.

Fluid inclusions in quartz veins sampled from the pluton across ambient alteration zones to the main ore body were petrographically classified as sequential assemblages. The majority are low salinity liquid-rich aquo-carbonic fluid inclusions, but vapor-rich and brine inclusions also occur. Each assemblage was studied *in situ* using micro-thermometry and LA-ICP-MS for quantification of Cu, Fe, Au, Pb, Zn and S concentrations [6]. The correlations of fluid properties are discussed to further interpret ore related fluid evolution and metal precipitation in the contrasting ore styles.

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Impact of chemical constructions on the microbial availability of phenanthrene sorbed on biopolymers

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Objectives and Methods

Natural organic matter has great influence on bioavailability of hydrophobic organic contaminants, which in turn affects their biodegradation and bioremediation [1, 2]. Degradation kinetics of natural biopolymer-bound phenanthrene (PHE) was examined. Based upon solid-state ^{13}C NMR and XPS spectra data of biopolymers, effects of their chemical structure and composition on bioavailability of PHE were examined in this work.

Results and Discussion

Our data indicated that 49.6±0.6% and 54.7±3.4% of cellulose- and wax-bound PHE was mineralized, while only 1.2±0.2% of this compound sorbed on lignin was degraded within 720 h. The simulation based on the degradation kinetics for the dissolved PHE suggested that the sorbed PHE was partially degradable.

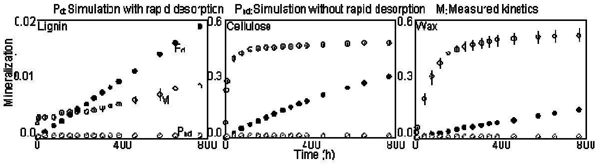

Figure 1: Degradation kinetics of PHE sorbed on lignin, cellulose and wax.

The ^{13}C NMR spectra data showed that aromatic carbon contributed 14.6% to lignin's total orgainc carbon content, and PHE was preferemtially sorbed to aromatic moieties as demonstrated by the difference in ^{1}H-^{13}C HSQC NMR spectra of original and PHE-sorbed lignin. XPS spectra data of lignin indicated that its aromatic carbon was inside the particle matrix. Cellulose and wax were composed mainly of C-O and aliphatic carbon forms, respectively. Compared to lignin and cellulose, bacteria cells preferred to attach on wax. Our observations showed that interactions of PHE and biopolymers and attachment of bacteria on biopolymers governed the bioavailability of PHE.

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