

Rita Park: Microbiology & Immunology

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Effect of coal particle size on microbial methanogenesis in the presence of oxygen

This project is a sub-experiment within the DOE-funded Microbially Enhanced Coal Bed Methane (MECBM) project, which studies methanogenesis in shallow coal beds of the Powder River Basin (PRB) located in southwestern Montana. The proposed research will observe the effects of coal particle size on: (1) methane production yield, (2) microbial diversity, (3) dissolved oxygen (DO) concentration in the coal bed methane (CBM) water, and (4) bioavailability of organics from the coal. Microbial CBM has a strong potential as an energy resource worldwide, but the exploitation of production wells with oxygenated surface waters may impact in situ microbial diversity and thus the methanogenic potential of coal beds. This experiment will provide further information on the oxygen-scavenging capacity of coal particles in CBM water, and subsequent impact on the anaerobic microbial methanogenesis. Cultures containing coal and CBM water from the PRB coal beds will be set up in triplicate glass bottles sealed with a rubber septum to allow for regular sampling. Coal of 2 particle sizes will be obtained with sieves: small ($0.075 < \phi < 0.85$ mm) and large ($18.3 < \phi < 28.3$ mm). These cultures will be treated with a methane-producing inoculum from a PRB coal bed; coal degradation and methane production will be monitored over time. This experiment will evaluate methanogenesis rates as a function of coal particle size and of subsequent DO levels in the CBM water. Results will provide a better understanding of the subsurface energy potential of MECBM.