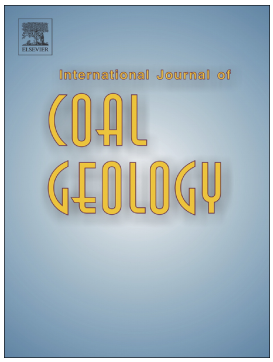

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Methane production from lignite through the combined effects of exogenous aerobic and anaerobic microflora

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Abstract To find more effective microflora for the pretreatment and bioconversion of coal to methane, the combined effects of exogenous aerobic and anaerobic bacteria were studied. The changes in ultimate composition, chemical bonds, intermediates, and coal surface morphology were also investigated via the ultimate analyses, including infrared spectroscopy (IR), gas chromatography-mass spectrometry and scanning electron microscopy (SEM). Aerobic activated sludge samples and biogas slurry were used as aerobic and anaerobic bacterial sources, respectively, after acclimatization. It was found that the community composition and the relative abundances of the anaerobic microflora at the level of phylum and class were very similar to those in the formation water as recently reported. The enriched anaerobic microflora efficiently converted coal to methane with a methane yield of 77.68 μmol/g. An aerobic pretreatment preceding anaerobic methane production tripled the methane yield (222.50 μmol/g). The cessation of methane production during the bioconversion