



Microbial alteration of organic coatings on sand grains

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Organically coated sand particles are found below brown coal seams. The coatings were formed in the Tertiary during transport of organic solutes and nanoparticles from coal layers to the underlying sand. The attachment of organic matter occurred on surfaces of the sand grains. Organic matter was stabilized in the sediment due to changing redox potential.

The organic coated sand grains are found in opencast pits. Exposure to oxygenated environment due to removal of the overlying sediments and relocation might induce microbial degradation. We investigate the microbial effect on the morphology and chemistry of these organic coatings on sand grains to study their stability.

To investigate the microbial influence on the alteration of organic coatings on grain surfaces we analysed the sand grains before and after the incubation with the fungus *Schizophyllum commune* using agar medium. Organic coatings are partially dissolved after the penetration of fungal hyphae because the basidiomycete is able to degrade organic matter by non-specific degradation mechanisms. The fungal growth enforces the fragmentation of the organic coatings on sand grains by physical effects. In consequence, microbial colonization results in the dissolution of organic coatings from the sand grain surfaces.

Different characteristic structures are generated by the fungi on the organic coatings on sand grains: Etch pits, etched channels and secondary mineral precipitation. Quartz surfaces appear to remain unchanged. These alteration structures are evidence of *Schizophyllum commune*'s ability to dissolve complex organic structures besides lignin.

Since organic coatings on sand grains are removable by fungal activity we expect release of organic matter due to microbial colonization. Exposition to oxygenated environment because of mining activity might cause microbial colonization and therefore destabilization of the containing organic matter.