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Surface Complexation Mechanism of Laccase on Hematite: An *in-Situ* ATR-FTIR Study

Abstract

Laccase, a multicopper phenol oxidase enzyme, is an important agent in various biological reactions such as non-specific oxidations of diphenols, polycyclic aromatic hydrocarbons, methoxy-substituted monophenols, aromatic amines, synthetic dyes, pesticides etc. In soil, laccases play a crucial role in carbon cycling and transformation of nonliving organic matters. Laccases can potentially modify xenobiotic compounds as well. Researchers have found that the enzyme activity of laccase can be affected when adsorbed on soil minerals. Also the effects are often related to the binding mechanisms of these extracellular enzymes on soil minerals. There is a large gap in the literature in terms of understanding surface complexation mechanisms of laccase on common soil minerals. Here we propose to investigate the retention mechanisms of laccase on hematite under a range of solution properties using *in situ* attenuated total reflectance Fourier transform infrared (ATR-FTIR) spectroscopic tools. Preliminary FTIR result suggested that amide and carbonyl functional groups most likely participated in the bonding interactions of laccase with hematite. Currently, there are ongoing experiments to identify the laccase surface complexation mechanisms on hematite under different solution properties.