

## **Removal of Ni and Co from high salinity, mining impacted water by Mn-oxidizing fungi**

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Naturally occurring manganese (Mn) oxides are often formed by microbial Mn(II)aq oxidation, resulting in sparingly soluble, nanocrystalline Mn(III/IV) oxide minerals with high reactivity that can control the uptake and release of many other metals (e.g., Ni, Co, Cu, and Zn) through different mechanisms. The effective sequestration of these metals from aqueous environments by biogenic Mn oxides highlights their bioremediation potential for these inorganic contaminants. During formation, the structure and composition of biogenic Mn oxides can be altered in the presence other metals as well as the chemistry of the aqueous environment, which in turn may affect their ability to bind these metals. Conditions extended to high salinity, low nutrient environments that are commonly found in mining and industrial wastewaters have not been well investigated to understand these metal interactions with biogenic Mn oxides. Thus, we conducted laboratory experiments using Mn-oxidizing fungi *Periconia* sp. SM10a2\_F1 isolated from a former iron ore mine to explore Ni and Co (metals of concern for the mine) removal processes, comparing mechanisms of Ni/Co in coprecipitation with Mn(II) versus sorption by fungal Mn oxides under high salinity and low nutrient conditions. Ni, Co, and Mn uptake by fungal biomass and Mn oxides were determined with wet chemistry techniques to determine the efficiency of metal removal from the saline media. X-ray absorption fine structure (XAFS) spectroscopy was used to determine Co and Mn oxidation states, target Co and Ni binding environments and Mn oxide structure transformation. Elemental and spectroscopic analysis were combined to understand the mechanisms of Ni/Co removal from saline conditions. Results from this study will bring new insight into fungi mediated bioremediation strategies.