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**Dynamic interfaces of manganese oxide and manganese carbonate substrate in the presence of cobalt** YOUNG-SHIN JUN, SCOT MARTIN, Harvard University — The transport and fate of metal contaminants in water are often affected by manganese oxide coatings. Direct microscopic observations of such dynamic reactions are sparse. In the current work, cobalt adsorption/co-precipitation with manganese oxides is studied by atomic force microscopy at circumneutral pH. Three complementary experimental protocols are employed: (1) Mn oxide film, (2) Mn oxide film and $Co_xMn_{1-x}O_y$ (mixed oxides), and (3) $Co_xMn_{1-x}O_y$. The appearance of islands are flat top and 2-$D$ rhombohedral (thickness: 2.4 nm) for Mn oxide, a stratum structure (2.3 nm and higher) for the mixed oxides, and round top (indefinite growth) for $Co_xMn_{1-x}O_y$. The island density (number/$m^2$) is Mn oxide film > mixed oxides > $Co_xMn_{1-x}O_y$. The macroscopic Mn dissolution rates of $Co_xMn_{1-x}O_y$ are slower than that of Mn oxide. In the case of the mixed oxides, the dissolution rates decreases by three times. Direct observations of interactions of cobalt with manganese oxide on manganese carbonate provide new insights into the interfacial reactions between coatings and substrate minerals in the environment.

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