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# Mineralogy of natural and synthesized Bacteriogenic Iron Oxides (BIOS)

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Mineralogy of natural and synthesized bacteriogenic iron oxides (BIOS) was studied using XAFS, micro-XAFS, SEM and EPMA. Natural BIOS were collected at 2 sampling sites: seafloor at Mariana trough and at stream from groundwater discharge at Sambe hot spring in Shimane prefecture. BIOS synthesis was carried out using diffusion cell which can simulate BIOS precipitation in natural condition. Chemoautotrophic bacteria (*M. ferrooxydans*) or heterotrophic bacteria (*L.discophora*) were cultured in one side of the diffusion cell. SEM and EPMA analysis showed similar precipitation morphology to all samples where iron oxides precipitate around bacterial-induced organic materials. Although each natural BIOS were precipitated at different environments, XAFS showed similar spectrum. Synthesized BIOS also show similar spectrum to natural samples regardless of the species of iron oxidizing bacteria and the medium employed in the culture. XANES fitting suggested that BIOS consist of ferrihydrite and iron-organic complex. This mineralogy will affect adsorption behavior of trace minerals onto BIOS.