Synergy of hematite and *Shewanella oneidensis* MR-1 in Cr(VI) reduction under sunlight irradiation

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Electron trasnfer between dissimilatory metal reducing microorganisms and iron oxide minerals is a prevalent redox process that influences carbon and iron cycling, as well as the fate and transport of contaminants at the Earth's near surface. It is well-recognized that the model Fe(III)-reducing bacteria, *Shewanella oneidensis* MR-1, can use the widespread Fe(III)-oxide mineral, hematite, as a terminal electron acceptor for extracellular respiration. Our recent study shows that, under sunlight irradiation, hematite can produce photo-induced electrons and holes. *S. oneidensis* produces bioelectrons from lactate metabolism, which can fill photo-generated holes and inhibit the recombination of the photo-induced electrons and holes in hematite. This synergy between hematite and *S. oneidensis* substantially improve the light-to-electricity conversion of the system, promote extracellular respiration of *S. oneidensis*, and also provide the reducing power to contaminants in the surrounding environment. In this study, we compared the rates and extents Cr(VI) reduction by hematite and *S. oneidensis* in dark and under sunlight irradiation, repsectively. Electrochemical analysis was conducted to study electron trasnfer at the interface between hematite and *S. oneidensis*. The results indicate that sunlight irradiation can efficiently promote Cr(VI) reduction, which is helpful to extend our understanding about the role of mineral-microbe interactions in energy conversion, electron transfer, and contaminant transport in natural environments.