Bioadsorption and bioreduction of Sb(V) by a marine bacterium in the presence of SO_3^{2-}/$S_2O_3^{2-}$

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Microbe-Sb interactions remain poorly understood and the mechanism of microbe-mediated Sb(V) reduction remains unknown. In the present study, we investigated the process and mechanism of Sb(V) bioreduction by *Shewanella* sp. CNZ-1, isolated from the sediment of Bohai Strait, in the absence or presence of sulfate/sulfite/thiosulfate. Results demonstrate that Sb(V) could be reduced to Sb(III) (including Sb_2O_3 and Sb(III)(aq) etc.) by CNZ-1 cells. Kinetic studies are carried out using Langmuir-Freundlich dual model and Monod model and the results reveal that Sb removal by strain CNZ-1 is a combined process including both bioadsorption (KLF, 1/n and a are 8.03, 0.0032 and 0.95, respectively; R2=0.98) and bioreduction (R^2=0.95). Moreover, the presence of SO_3^{2-} and $S_2O_3^{2-}$ can lead to the formation of Sb2S3 along with the reduction of SO_3^{2-} and $S_2O_3^{2-}$, while SO_4^{2-} can't. The precipitates of Sb2S3 and Sb2O3 are further characterized and confirmed by SEM-EDX, XPS and XRD. In addition, global transcriptome assays reveal that genes encoding dehydrogenase, cytochrome, reductase, stress resistance protein, membrane proteins and transporters play key roles during transformation of SO_3^{2-}/$S_2O_3^{2-}$ by CNZ-1 cell.