Biomineralization of seledide: Implications for Se bioremediation and recovery

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Microbial biomineralization influences the cycling and sequestration of a variety of metal(loid)s in the environment[1]. Hence it could be regarded as one of the most effective, affordable and eco-friendly strategies for heavy metal(loid) remediation. Selenium oxyanions biomineralization induced by microbes usually forms Nano-scale elemental Se (SeNPs). However, the colloidal stability and re-oxidation of the bioNSe suspensions hamper a straightforward removal and recovery by gravitational settling[2]. Here, we introduced copper ion (Cu(II)) during selenite bioreduction by *Bacillus Licheniforms* SeRB-1 at effective conditions to tackle the problems.

Dark grey precipitations occurred in cultures during the biomineralization. TEM images showed granules (tens of nm) mainly formed on the envelops at initial stage, and finally aggregated to 300-400 nm particles. SAED indicated the biomineral was amorphous. EDS analysis illustrated that Se and Cu were the main components of the minerals, and XAFS further confirmed some kind of copper selenide formation. This study suggested that the two ions could be co-biomineralized to new Cu_xSe_y biominerals (e.g. CuSe) by SeRB-1, though the process was a bit slower than bioNSe biomineralization. Thus this study revealed a new perspective for effective bioremediation of Se and heavy metals, and shed light on Se recovery .

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References:

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