

Biom mineralization processes of selenide by experimental incubation

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Selenium nanoparticles (Se NPs) biomineralization has been extensively reported, yet selenide formation and biogenic process remained poorly studied. Here we present lab simulation of iron selenide biomineralization by adding moderate ferrous ion (Fe(II)) at effective conditions, based on mineralization of Se NPs by *Bacillus licheniformis* SeRB-1.

Dark grey precipitations occurred in cultures during the mineralization. TEM images showed that fine granules (10- 100 nm) were first regularly present along the cell envelopes at early phase; and then they increased to larger particles (about 150- 360 nm) at middle phase when plasmolysis and cell vacuolation appeared in most cells. At late phase, cells were further decomposed to debris, to which particles attached and finally formed larger aggregates. Though SAED showed the minerals were amorphous, EDS illustrated that Se and Fe were the main components of the minerals and XAFS further confirmed iron selenide present.

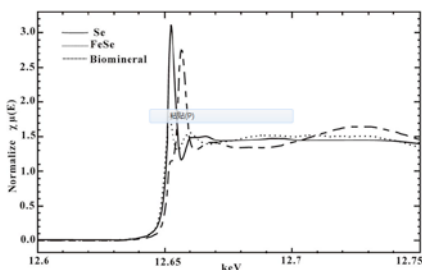


Figure. 1 XAFS spectrum of Se, FeSe and selenide biominerals

This study demonstrated cell membrane was the main position of ion nucleation, and the generation process of selenide biominerals. It may shed light on biomineralization from mesoscopic perspectives.