Biomineralization of Iron and Silica in Edmond Hydrothermal Chimney, India Ocean

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Several millimeters thick of microbial mats in a brown-yellow to white color which occur in hollow inside of chimney structure from Edmond hydrothermal field in India Ocean Ridge were collected and investigated. It is shown by SEM that silica-rich spheroids formed epicellularly on cell walls and surrounding sheaths and capsules of microorganisms in microbial mat. By TEM-EDS, it is clearly that those cells are completely encrusted by amorphous matrix and minor amount of iron hydroxides. Silica matrix is generally about 0.2-1.0μm in thickness. Some cells nearly completely intracellularly replaced by silica matrix. Iron hydroxides are generally separately distributed from silica matrix. There are three different forms of iron hydroxides, fine granules with a size of about 1nm in cytoplasm, grains of several dozen of nanometer along inner side of silica matrix and spicular minerals of about 100-400nm disseminated outside of silica encrust. Mineralization of silica and iron is obviously influenced by microbial activity in hydrothermal system，although the relations among silica, iron and microbial cells and the formation mechanism of minerals will be further studied.

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