

Modification of Organisms by Inorganic Materials

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Biom mineralization is an important tactic by which biological organisms produce hierarchically structured inorganic minerals with marvellous functions. Biom mineralization studies typically focus on the mediation function of organic matrices on inorganic minerals, which helps scientists to design and synthesize bioinspired functional materials. However, the presence of inorganic minerals may also alter the native behaviours of biological organisms and in nature, biom mineralization plays a key role in promoting organism evolution. Accordingly, it represents another tactic that scientists can utilize to improve biologicals with functional materials. Typical achievements in this newly emerging research area include biom mineralized vaccines, which are “thermostable vaccines that do not need refrigeration”, and biom mineralized algae for the biological photosynthesis of hydrogen. Besides, the inorganic mineral phase produced by target cell calcification can be used as an alternative drug-free chemotherapy of cancers. These results represent the achievement of successful biological functional improvements using inorganic materials. It is suggested that the rationally designed organism-material hybrid complex can shed light on solving several global problems. The successful modification of biological systems using materials is based on the regulatory effect of materials on organisms, which can be extended to understand the recognition of organic molecules by using inorganic compounds. Unlike previous studies, our study integrates materials and biological science to achieve a more comprehensive view of the mechanism and applications of biom mineralization, which highlights the material-based regulation of life systems.