The Influence of Increased Iron Concentrations on the Biosilica of the Marine Diatom Stephanopyxis turris

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Numerous metals and trace elements such as aluminum [1], germanium [2], and titanium [3] can be accumulated by diatoms and inserted into their silica based frustules. In a previous study, the uptake of aluminum into the biosilica of the centric diatom *Stephanopyxis turris* has been already investigated. Significant incorporation of aluminum up to an aluminum to silicon ratio of 1:15 has been observed [1]. It is also known that iron is associated with the biosilica, of marine diatoms [4]. Furthermore Godinho *et al.* hypothesized that iron is co-deposited within silica so that the silica serves as a biological sink [5]. Besides, the incorporation of iron into synthetic silica in iron-rich environment leads to a shift of the band of antisymmetric valence stretching of Si-O-Si to lower wavelength [6]. The present study examines the influence of increased iron concentrations upon the composition and structure of the biosilica of *S. turris*. The iron-exposed cells are characterized both in the native state and after cell wall extraction with SDS/EDTA by infrared spectroscopy (IR) and Raman spectroscopy (Raman) to detect and identify organic molecules. Moreover, the massive fluorescence in Raman spectroscopy occurring in extracted cell walls represents a challenge, which needs to be resolved. By means of inductively coupled plasma optical emission spectroscopy (ICP-OES) and vibrational spectroscopy, we analyze the content of iron and silicon in the biosilica. Morphological and structural changes of the siliceous frustules can be visualized by scanning electron microscopy (SEM).

References

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