

## NANOPOROUS BIOSILICA PRODUCED BY DIATOM CELLS CULTURED IN THE PRESENCE OF METALS.

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Nanoporous biosilica produced by living diatom cells is one of the most unique architectures in nature. The size of frustules is varied from several microns to several hundred microns. The size of nanopores is varied from several nm to several hundred nm size. Although the nanoporous silica called frustules have been widely used for industrial applications such as water filters, building materials, etc, several research groups have started combining diatom frustules and nanotechnology as a new approach. For example, preparation of metal/carbon replica using a frustule, use of frustules as templates for nanoimprint, and fabrication of single frustule NO<sub>x</sub> sensor were reported these several years. [1]-[5] Furthermore, in order to functionalized frustules, injection of nickel and titanium into frustules by culturing living diatom cells with the specific metals. [6]-[7]

In this paper, we demonstrated introducing platinum and titanium into diatom frustules of *Navicula* sp. and *Melosira nummuloides* by cultivation in the presence of those metals. The diatom cells were well grown in the medium when concentration of metals was less than 05 mg/L. After the cultivation, frustules were purified and characterized by scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy (XPS). SEM images clearly showed that the shape of the obtained frustules was not significantly different from that of wild frustules.

Figure 1 shows typical example of SEM images of diatom frustules that were grown in the presence of platinum. Enough amounts of frustules were obtained during usual cultivation period (Fig.1A). Nanoporous structures were confirmed on frustule surfaces (Fig.1B). The SEM images suggested that complete structures of nanoporous biosilica were well produced even in the presence of metals.

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Figures:

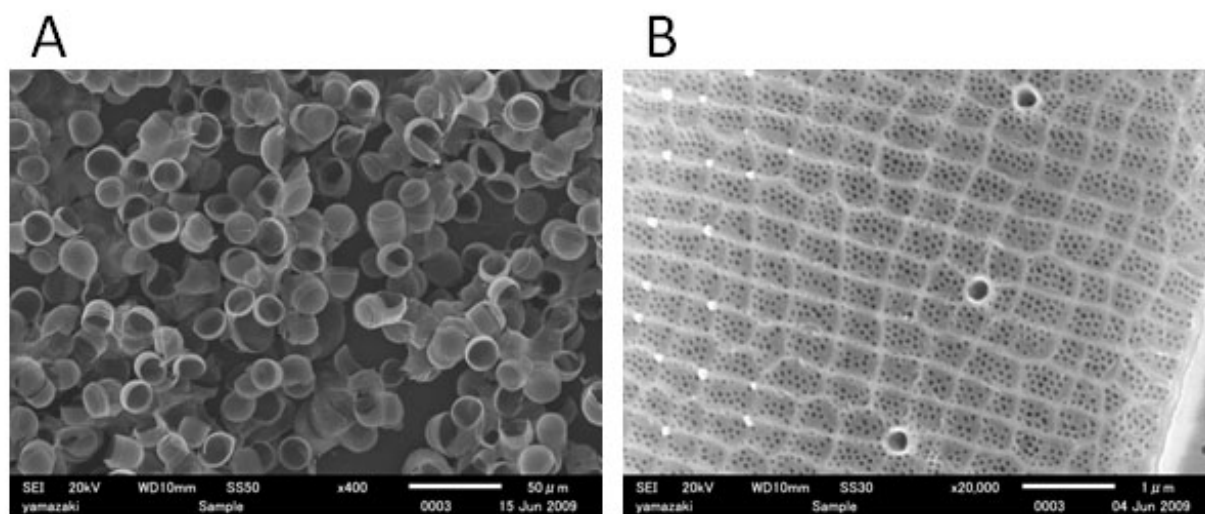


Figure 1 SEM images of purified frustules that were grown in the presence of metals. (A) Scale bar is 50  $\mu\text{m}$ . (B) Scale bar is 1  $\mu\text{m}$ .