Abstract Submitted
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Local structure in diatom biosilica probed by synchrotron x-ray diffraction MICHAEL DIBICCARI, Hauppauge High School, SEO-YOUNG KWAK, Brookhaven National Laboratory, GEOFFREY HIND, Brookhaven National Laboratory, ELAINE DIMASI, Brookhaven National Laboratory — Diatoms are single-celled algae that form intricate outer shells, or frustrules, composed of biosilica. They have attracted attention in the context of nanotechnology, since the submicron architectures are genetically determined and thus potentially could be reproduced synthetically, by using organic additives that mimic the proteins responsible for controlling biological silicification. We have compared the local atomic structure of diatom biosilica to that of inorganic silica with synchrotron x-ray diffraction, analyzed as the Pair Distribution Function (PDF). Specimens of Thalassiosira weissflogii (Tw) were cleaned of organic matter using either hydrogen peroxide, commercial bleach, or sodium dodecyl sulfate treatments. Low resolution PDF measurements ($q_{\max} \approx 13.6$ Å^{-1}) were made of wet and dry Tw, pure silica microspheres, and diatomaceous earth containing 15% mineral impurities. All samples have similar PDFs, demonstrating that local structure in diatoms and synthetic silica are equivalent, and that the PDF method is insensitive to biological impurites.

Elaine DiMasi
Brookhaven National Laboratory

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