

Diatoms – an amazing resource

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Diatoms are unicellular microscopic algae with cell walls consisting of silicon dioxide with a small amount of water. The cell wall consists of two halves, like a box with a lid. The cell wall (frustule) has a specific pattern of tiny pores, each pattern is species-specific. The pores allow exchange of nutrients and waste products. The number of species is estimated to 20 000-2 000 000, new species are continuously identified and described. The size range is a few micrometers to half a millimeter. Fossils indicate that diatoms have existed for at least 200 million years.

Diatoms are to be found everywhere where it is moist and enough light: in the ocean, on the sea floor, lakes, in and on ice, and even on cave walls. Sometimes they form long filaments by adding cell after cell in a thread up to 3 m length. They form the basis of the food web and are eaten by everything from the size of microscopic ciliates to whales. Diatoms photosynthesize but they are also able to uptake small organic molecules. Thus, they can survive in darkness without forming resting stages. Diatoms contain chlorophylls a, c1, c2, and, in addition, different carotenoids such as fucoxanthin, which give them a brownish color. They store energy in the form of oil (lipids) and the carbohydrate chrysolaminarin.

The frustules have one to three layers of nanopores, which can be used in several industrial applications. For example, this frustule material can be used to increase the efficiency of solar panels due to the structures light trapping property. The structure also blocks UV light efficiently, which can be utilized in e.g. sunscreens and plastics. Due to the materials nanoporosity it also takes up and releases chemical substances efficiently, which can be utilized in a lot of different applications. The oil produced by diatoms is excellent for use in fish feed production or even food supplements due to the content of polyunsaturated fatty acids. In our prototype facility in Kungshamn and in our Gothenburg lab, we are constantly exploring new ways for how to convert our findings into valuable products. Energy storage, UV resistant paint and plastic, cosmetics, feed, fertilizers... the only limit is our own imagination!
