## Potential of disk-shaped small structures, coccoliths, to promote the efficient bioenergy production

Researchers at Hiroshima University showed that the coccolith disks made of calcium carbonate in *Emiliania huxleyi*, one of promising biomass resources, potentially perform roles in reducing and enhancing the light that enters the cell by scattering the light. To figure out the physiological significance of coccoliths formation in *E. huxleyi* can contribute to promote the efficient bioenergy production using microalgae.

Energy issue is one of the most important problems on earth. Recently, many types of renewable energy resources such as solar light, wind, water, and biomass have attracted attention instead of fossil fuels.

Coccoliths are disk-shaped plates of calcium carbonate formed by coccolithophores which are single-celled algae such as *E. huxleyi*. The most important question concerning coccolith function is how they manage solar light exposure in the ocean where huge blooms of E. huxleyi (italic) have frequently been observed as satellite images by SeaWiFS Color Senor from space. Recently, studies that focus on the optical function of coccoliths have been reported. In these studies, the light scattering of randomly oriented coccoliths was measured.

Professor Masakazu Iwasaka at Hiroshima University and Professor Yoshihiro Shiraiwa at University of Tsukuba prepared an aqueous suspension of isolated coccoliths from *Emiliania* cells and examined their light-scattering properties. The research group demonstrated that the coccoliths showed Brownian motion when floating in water, and the thermal fluctuation at room temperature caused disorder in the coccolith orientation.

Professor Iwasaka said “Surprisingly, the percent of coccoliths oriented to the same direction increased during the 400 mT to 500 mT magnetic field exposure”
“In addition, an individual coccolith has a specific direction of light scattering” Professor Iwasaka explained.

These results can contribute to understand how the coccoliths control the light and utilize optical energy to photosynthesis of *E. huxleyi*. Furthermore, the ability of

coccoliths to modify light suggests their potential in applications as new micro/nano optical devices since no artificial method exists to reproduce precise structures, such as a coccolith without a coccolithophore.

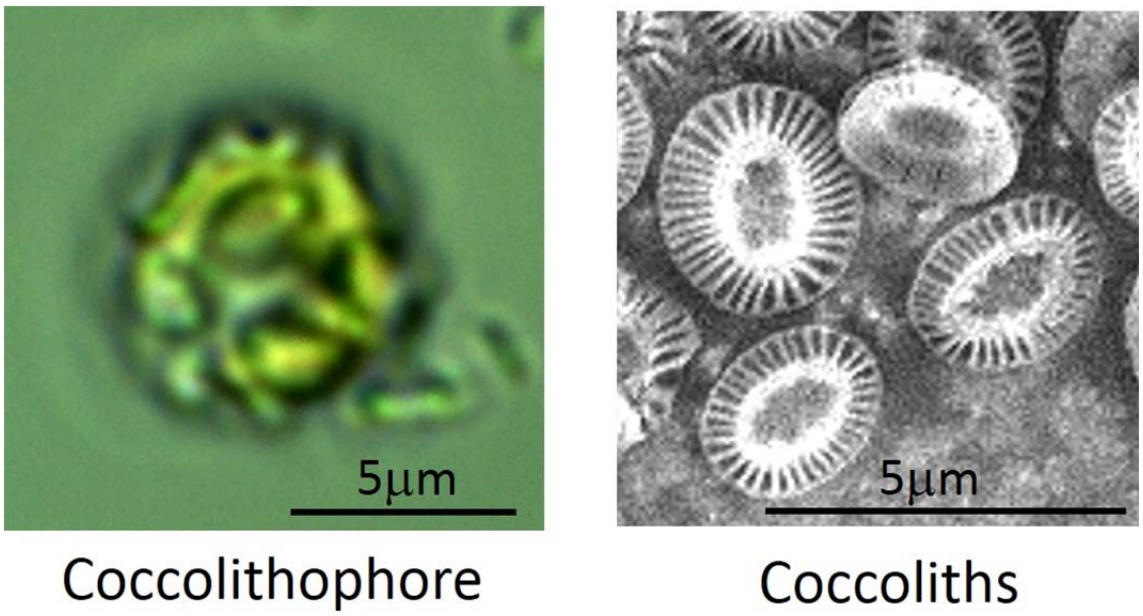


Figure. Coccolithophore phytoplankton *Emiliania huxleyi* and cell covering crystals of calcium carbonate, coccoliths . The size of coccoliths are 2 to 3 μm in diameter.