

NISHIDA LAB.

[Ocean Nanosensing]

Department of Mechanical and Biofunctional Systems

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Ocean Nanosensing

Department of Systems Innovation

Underwater Nano-Visualization

In-situ Underwater Atomic Force Microscope

◆ Research Purpose

In ocean, there exist various small pelagic resources, which are important environmental elements of the earth. For example, the micrometer-sized phytoplankton play significant roles in the ocean carbon cycle. Our research purpose is to visualize the precise morphology of micro samples in deep sea with high-spatial-resolution down to nanometer scale, for revealing new findings of the nature of ocean.

◆ Research Subject

We are developing a novel *in-situ* underwater Atomic Force Microscope (AFM) system, which is mountable on underwater vehicles. The system is composed of three technological elements essential for operation in deep-sea as follows:

- Portable underwater AFM: Miniaturization, Weight saving, Water pressure resistance
- Sampling mechanisms using microfluidic devices: Sample collection, Filtration, Sorting, Sample fixing, Environmental control
- Mount mechanisms for underwater vehicles: Vibration isolation, Automatic control

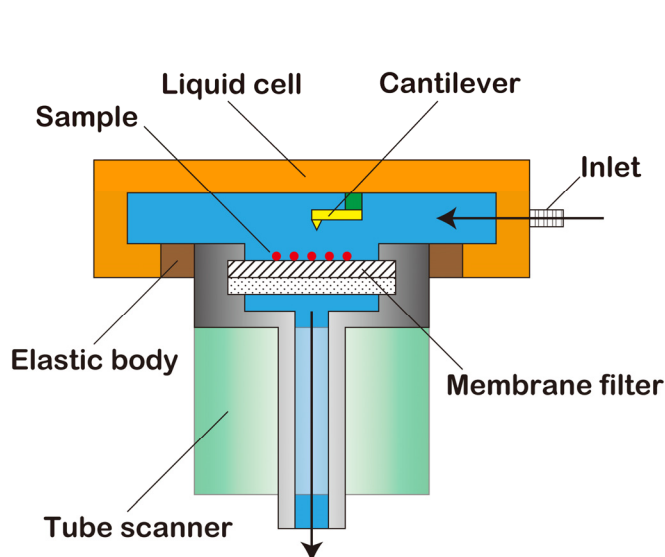


Fig. 1. Underwater AFM

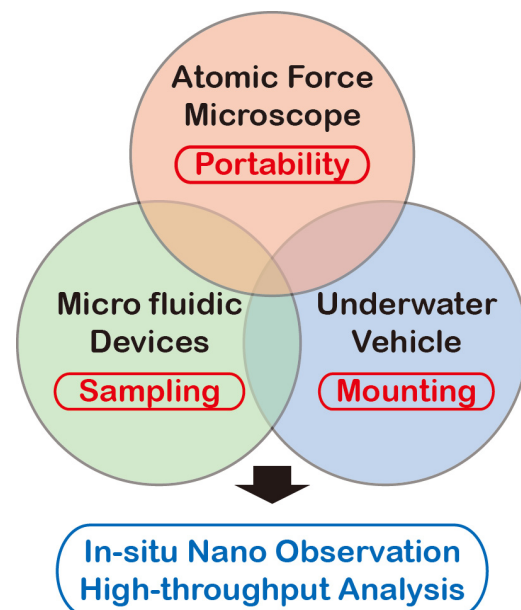


Fig. 2. Concept of *in-situ* underwater AFM system