

Sorting of oceanic phytoplankton on On-chip Sort

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Introduction

Our microfluidic chip-based cell sorter, On-chip Sort, is a compact instrument that uses disposable chip as the core of the technology. Unlike conventional cell sorters where a specified liquid has to be used as sheath fluid, due to the unique sorting mechanism of On-chip Sort, any liquid appropriate to your cells can be used as the sheath fluid. This includes sea water, fresh water and even oil. On-chip Sort was capable of isolating oceanic phytoplankton on a research vessel (Fig. 1) for downstream analysis of stable isotopes of carbon and nitrogen due to the compactness, the ability to prevent cross-contamination between samples, and the ability to choose seawater as the sheath fluid.



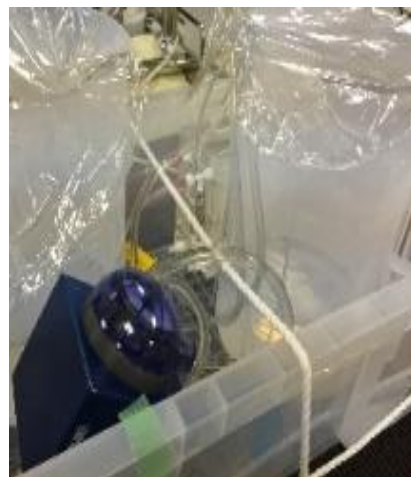
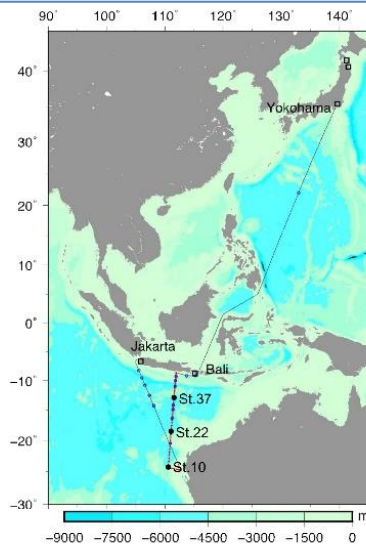
Fig. 1. "Mirai", the oceanographic research vessel (left), and the image of On-chip Sort set up on the vessel (right).

Results

Following the experimental workflow on Fig. 2, On-chip Sort successfully isolated oceanic phytoplankton from three different locations off the Indonesian coast on a research vessel, which facilitated the downstream analysis of stable isotopes of carbon and nitrogen.

Application Note

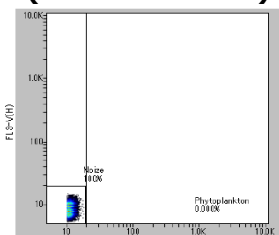
Methods



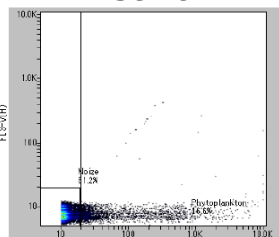
Collect sea water from three locations off the Indonesian coast (St. 10, 22 and 37) at 90m depth where there is maximum chlorophyll

Concentrate sample 500 times by ultrafiltration

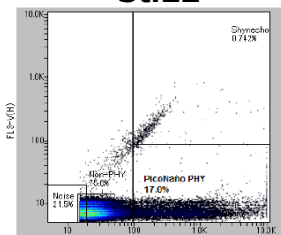
**Negative control
(Filtered water)**



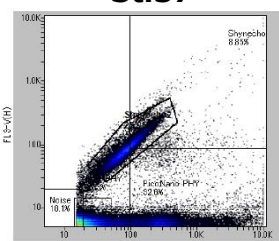
St.10



St.22



St.37



Isolate phytoplankton from different locations based on autofluorescence using On-chip Sort. Use filtered sea water as sheath fluid for sorting. Collect isolated phytoplankton on a custom-made 4mm glass filter for secondary analysis.



Bring isolated phytoplankton back to laboratory on land. Perform nitrogen /carbon isotope measurement using Ultrahigh-sensitivity Elemental analysis isotope ratio mass spectrometry (Ogawa et al., 2010)

Fig. 2. Experimental overview.