

## **Floating particles with high copper concentration in the sea-surface microlayer**

### **ABSTRACT**

This study sought to clarify whether suspended particles containing high Cu concentrations are present in the sea-surface microlayer (S-SML). For this reason, suspended particles (10-2000  $\mu\text{m}$ ) in the S-SML were collected periodically from a ship mooring pond during 2018-2020, and the acid-soluble Cu concentration in the suspended particles was measured as particulate Cu (P-Cu). The highest concentration of P-Cu in the S-SML of the pond was 75  $\mu\text{g L}^{-1}$  with a 90th percentile value of 2.5  $\mu\text{g L}^{-1}$ . This is below P-Cu values reported for the S-SML in North American ports, but 140 times higher than this found in bulk seawater in the Atlantic Ocean. The highest P-Cu concentration in the S-SML of non-organism (abiotic) origin was 17  $\mu\text{g L}^{-1}$ , and the abiotic P-Cu to P-Cu ratio varied from 0.2 to 100%, likely depending on the quality and quantity of biogenic material in the S-SML samples. It is assumed that the S-SML particles examined here contain high Cu concentrations originating from ship antifouling paints.

**Keyword:** Antifouling agents; Copper; Particulate matter; Surface microlayer; Suspended matter