

Supplementary Materials

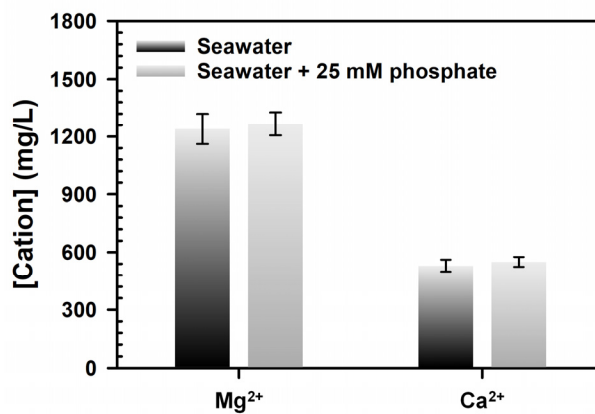


Fig. S1. Mg²⁺ and Ca²⁺ ion concentrations in seawater after a 10 min reaction with phosphate buffer.

(a) Ballast water treatment facility



(b) Field evaluation

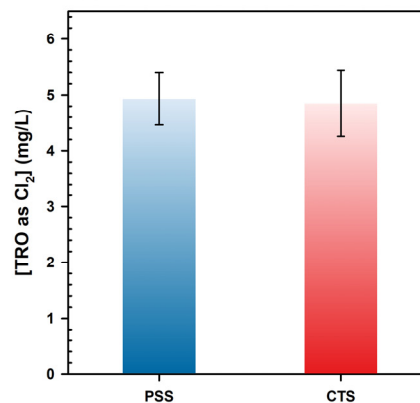


Fig. S2. (a)KIOST ballast water treatment facility and (b) the field evaluation results.