

# Arsenic Speciation and Bioavailability to Macroalgae in Seawater

メタデータ	言語: eng 出版者: 公開日: 2020-01-10 キーワード (Ja): キーワード (En): 作成者: メールアドレス: 所属:
URL	<a href="http://hdl.handle.net/2297/00056559">http://hdl.handle.net/2297/00056559</a>

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 International License.



甲 (Kou)  
様式 4. (Form 4)

# 学 位 論 文 概 要

## Dissertation Summary

学位請求論文 (Dissertation)

題名 (Title) Arsenic Speciation and Bioavailability to Macroalgae in Seawater

(邦訳) (Title in Japanese) ヒ素のスペシエーションと海洋大型藻類に対する生物可用性

専攻 (Division) : Material Chemistry

学籍番号 (Student ID Number) : 1624022005

氏名 (Name) : Mamun Md Abdullah Al

主任指導教員氏名 (Chief supervisor) : Hiroshi Hasegawa

学位論文概要 (Dissertation Summary)

The metalloid arsenic (As) has no well-known biological function, but it is a widely distributed food chain contaminants and ranked a number one of the top priority hazardous substances in the environment. Arsenate (As(V)) and arsenite (As(III)) are the primary bioavailable inorganic forms in aquatic systems and are actively subjected to biotransform upon their exposure. Marine microalgae and macroalgae have shown enormous As accumulation and transformation capacity, and are the chief contributor of reduced, methylated, and/or other organic As species in the marine environment, hence play a crucial role in As biogeochemical cycle. The recent discoveries of more than 50 arsenicals in marine organisms have extended the research field on As speciation. The information on the formation processes of As species, as well as their nature and distribution, is essential because of their complex chemistry and variable ecotoxicological effects on the marine ecosystems. As detoxification and/or biotransformation processes by the algae are habitat and species-specific, and it is necessary to investigate how marine macroalgae species interact, accumulate, detoxify, and produce As species in seawater and redistributed in marine food web with respect to their importance in As cycling. A series of laboratory culture experiments were designed with different macroalgal species namely *Undaria pinnatifida*, *Sargassum horneri*, *Sargassum patens*, and *Pyropia yezoensis* in seawater, and the following issues have been reported: (a) examination of the bioavailability of As species in terms of algal growth and photosynthetic activity; (b) observation of the accumulation, biotransformation, and extrusion behavior of As under different molar ratios of As and P; (c) investigation of the formation of Fe-plaque with or without coexisting Fe in the algal culture system; (d) demonstration of the modelling of As uptake rate; and (e) elucidation and comparison of the tolerance and metabolism diversity among macroalgae. The results of the proposed experiments are helpful in the understanding of the roles of macroalgae on As biogeochemical cycle in the marine environment.