Arsenic uptake and speciation in the green marine alga *Ulva lactuca*: Development of a coastal aquatic bioindicator

CATHERINE PHAM[1,2]*, LAURENT CHARLET[2] AND GARRISON SPOSITO[1]

[1]Division of Ecosystem Sciences, University of California, Berkeley, CA 94720-3114, USA (*correspondence: pham@cal.berkeley.edu, gsposito@berkeley.edu)

[2]ISTerre, University of Grenoble, BP 53, 38041, Grenoble, France (charlet38@gmail.com)

Algae are ubiquitous in surface waters and are known to influence the biodynamics of the priority toxic metalloid arsenic (As) in polluted marine environments. In the present study, we investigated the bioavailability and chemical forms of As in algae sampled from contaminated coastal waters in France and California in order to understand As cycling in the marine environment using synchrotron-based spectroscopic techniques.

Given the alga's unique morphology and cell size (15-50 µm cell diameter; 50-100 µm thallus thickness), STXM and µXRF were used for the first time to date to analyze *Ulva lactuca* to distinguish the different target organelles and map As speciation *in situ*. We observed shifts at the carbon 1s edge in response to As and phosphate gradients and are exploring the importance of arsenosugars.

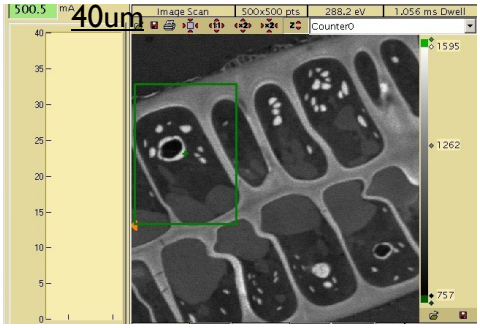

Figure 1: Cross-section of *Ulva lactuca* perpendicular to the axis of the thallus using STXM at 288.2 eV.

We are characterizing the potential risks As may pose to both ecological and human health as it is transformed into various chemical forms and moves from algae up trophic levels, potentially to fish and humans. Our research may serve as a basis for the future use of algae in biomonitoring and phytoremediation scenarios related to metalloid contamination in aquatic ecosystems.

Evidence from zircon ages and Hf isotopic composition for Paleoproterozoic crustal evolution in Northwestern Vietnam

PHAM TRUNG HIEU[1,2]* AND F. CHEN[3]

[1]Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, 100029, China (*correspondence: fanzhongxiao@126.com)

[2]Hanoi University of Mining and Geology, Vietnam

[3]School of Earth and Space Sciences, University of Science and Technology of China, Hefei, China (fkchen@ustc.edu.cn)

The Phan Si Pan area of NW Vietnam is one of the oldest basements in SE Asia. Paleoproterozoic is worldwide an important era in crustal evolution with occurrence of megascale tectonothermal activities, but the record is not much clear in NW Vietnam. In order to reveal the nature of Paleoproterozoic events in NW Vietnam, a combined study of zircon U-Pb ages and Hf isotopic composition was done on metamorphosed sedimentary rock and migmatite in the Phan Si Pan area, being an Archean basement exposed in NW Vietnam. Zircons yield U-Pb ages of 1.83 ±0.08 Ga. These Paleoproterozoic zircons have Th/U ratios of 0.02-0.25, indicating both magmatic and metamorphic origins. They are characterized by old Hf model ages of ~3.1 Ga and negative ε_{Hf} (t) values of about -10, implying Archean source (s). From these results, it is proposed that the Paleoproterozoic global thermal event (s) must have been taken place in NW Vietnam at least with reworking of Archean continental nucleus.

Based on a survey of the Paleoproterozoic events throughout the Phan Si Pan area, it can be observed that metamorphic and simultaneous magmatic event (s) have occurred in the northern part connected with the South China craton, but only magmatic activity have been distinguished in the southern part (the Bao Ha complex) so far. These metamorphic and magmatic activities were probably associated with the formation of a unified basement in NW Vietnam and likely imply continental accretion during the assembly of the Columbia supercontinent in Paleoproterozoic.