BOOK OF ABSTRACTS

# ISAP 2024

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## Biodiversity and applications of algae

### (23130) - EXPLORING THE SUBCELLULAR DISTRIBUTIONS AND UPTAKE MECHANISMS OF CHEMICAL ELEMENTS IN SEAWEED USING NANOSCALE SECONDARY ION MASS SPECTROMETRY (NANOSIMS)

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**Abstract**
Seaweeds play a crucial role in coastal ecosystems and provide us with valuable services and resources. Therefore, it is essential to understand the interaction between them and the chemical elements in the environment. This is especially true considering that coastal waters are particularly sensitive to pollution, and that seaweeds are often used to monitor it.
Despite their relevance, the mechanisms underlying this interaction remain poorly understood, including the uptake pathways and the fate of the assimilated elements. In this study, we aim to address these gaps by directly visualizing the location of elements within seaweed cells using nanoscale secondary ion mass spectrometry (NanoSIMS), a novel technique that enables the imaging of elemental distributions at the nanoscale.
To achieve this, we collected thalli of *Fucus vesiculosus* (Ochrophyta) from two sites on the coast of NW Spain, one unpolluted and one affected by Pb pollution. Subsequently, we transplanted them into both locations to test short term accumulation and discharge. Later, we retrieved the transplants and prepared them for NanoSIMS analysis by cryo-fixation. We obtained images using electron microscopy and analyzed their elemental distributions using NanoSIMS.
This methodology enabled precise mapping of the distribution of elements such as Pb, Na, and Ca, allowing to identify the cellular compartments where they were accumulated. The subcellular distribution exhibited considerable variation among elements, with some located almost entirely in the intracellular compartment and others bound to the cell wall and external polysaccharides. The accumulation patterns in different transplants provided insight into their respective uptake mechanisms.

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**Keywords: brown algae, pollution, biomonitoring, NanoSIMS, seaweed**

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# CERTIFICATE

We hereby certificate that the work

***Exploring the subcellular distributions and uptake mechanisms of chemical elements in seaweed using nanoscale secondary ion mass spectrometry (NanoSIMS)***

was presented as ***Oral Presentation***, at the **8th Congress of the International Society for Applied Phycology**, which was held in Alfândega do Porto, Portugal, from the **16th to the 21st of June, 2024**.

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