

Multimodal Synchrotron Approaches for the Sustainable Valorisation of Sargassum Biomass

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Turning a
marine challenge
into high-value
sustainable
solutions

BACKGROUND

Massive accumulations of pelagic *Sargassum* along Atlantic and Caribbean coastlines pose a growing environmental and socio-economic burden and, at the same time, constitute an abundant renewable feedstock for high-value bio-based products.



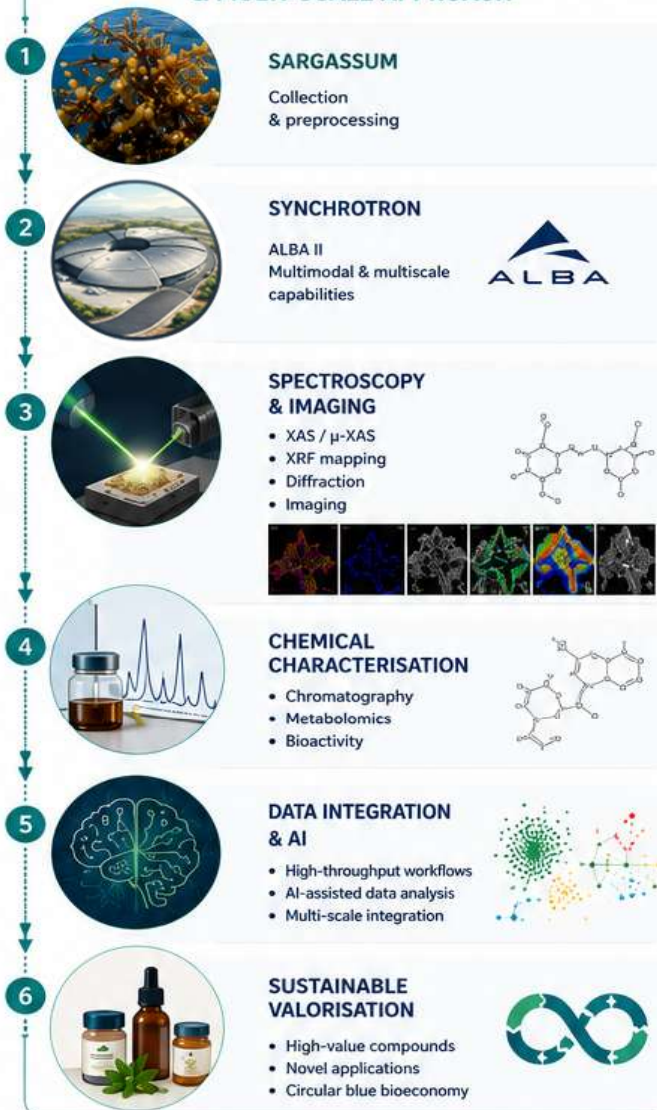
SCIENTIFIC CHALLENGE

The chemical complexity and heterogeneity of *Sargassum* biomass require advanced analytical methodologies to map elemental speciation and distribution, resolve mineral-organic interactions, and track structural changes during biomass processing and biorefinery.



→ Understanding their chemical forms, spatial distribution and transformations is key for safety assessment and defining viable valorisation pathways.

INTEGRATED MULTIMODAL & MULTI-SCALE APPROACH



SYNCHROTRON TECHNIQUES AT THE CORE



EXPECTED IMPACT

- ✓ Complete chemical characterisation of *Sargassum*-derived materials
- ✓ Optimisation of extraction and biorefinery processes
- ✓ Identification of high-value compounds
- ✓ Safe and sustainable applications
- ✓ Strengthening the circular blue bioeconomy



KEY MESSAGE

By integrating cutting-edge synchrotron techniques with complementary omics, AI and bioactivity studies, SARGEX will deliver the knowledge and tools needed to transform *Sargassum* biomass into **safe, high-value** and **sustainable** products.



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