



# BOOK OF ABSTRACTS

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## Probing the stability of the food colourant R-phycoerythrin from dried Nori flakes

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The high content of vitamins, minerals, antioxidants, and proteins makes red algae *Porphyra* sp. (Nori) superfood with exceptional health-promoting benefits. Its intense colour originates from R-phycoerythrin (R-PE), phycobiliprotein containing covalently attached tetrapyrrole chromophores: red phycoerythrobilin and orange phycourobilin. The present study aims to characterize the stability of R-PE, a natural colourant with a high potential for application in the food, cosmetic, and pharmaceutical industries. We purified R-PE from dried Nori flakes with a high purity ratio ( $A_{560}/A_{280} \geq 5$ ). Far-UV CD spectroscopy showed that  $\alpha$ -helix is the dominant secondary structure (75%). The thermal unfolding of  $\alpha$ -helix revealed two transitions ( $T_{m1}$  and  $T_{m2}$  at 56 and 72°C, respectively), ascribed to the different subunits of R-PE. Absorption measurements showed that high pressure (HP) induces dissociation of R-PE into subunits followed by subunit unfolding. Contrary to temperature, HP treatment showed a significant advantage under applied conditions: the protein unfolding is partly reversible, and the R-PE colour bleaching is minimized. Based on the fluorescence quenching approach, R-PE's binding affinities for  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$  ions were  $6.27 \times 10^5$  and  $1.71 \times 10^3 \text{ M}^{-1}$ , respectively. Absorption and near-UV/VIS CD spectroscopy suggested conformational changes in protein chromophores upon metal ions binding. Far-UV CD spectroscopy did not reveal that metal binding affects R-PE structure. The obtained results give new insights into the stability of R-PE with a good use-value in replacement of toxic synthetic dyes, preservation of R-PE red colour in fortified food and beverages by HP processing, and as a biosensor for  $\text{Cu}^{2+}$  in aquatic life systems.

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