



Contribution ID: 130

Type: Talk (17 + 3 min)

## Organisation of photosynthetic thylakoid membranes during simulated coral bleaching - a SANS study

*Monday 20 March 2023 11:50 (20 minutes)*

Small angle neutron scattering (SANS) is a non-ionizing and non-destructive statistical probe of structure. When applied to actively metabolizing cells it can provide a perspective on structural changes associated with cell physiology. Here we report on the application of SANS to understand environmentally induced physiological changes of corals. Corals bleach under a number of stresses, one of these being thermal stresses exemplified by the 2010, 2016 and 2017 bleaching events in Australia's Great Barrier Reef. The aim of this work is to utilize SANS to probe the arrangements of the intra-cellular membranes associated with photosynthetic apparatus of the symbiotic algae known as zooxanthellae or Symbiodinium living in hospice in coral cells. Here we report on the temperature induced rearrangements of photosynthetic membranes in Symbiodinium living within individual Aiptasia anemone specimens extracted from SANS data using a model of the structure. The SANS curve is a number of broad peaks superimposed on a Porod like decay. These shape, relative intensity and angular position of these features are analysed within a model of the organisation of membranes developed from electron microscopy. The results provide a simple perspective on the effects of temperature on the photosynthetic machinery of the symbiote.

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**Session Classification:** Proteins & Peptides seen by Neutrons

**Track Classification:** Health and Life Sciences