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Understanding in vivo bilayer organization in photosynthetic algae with small angle neutron scattering

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Photosynthesis is a biochemical process by which sunlight is converted into chemical energy. As a major input of energy into the terrestrial environment, where for example, the Archean origins of this process represent an important geological timescale event in the evolution of the terrestrial environment.1 The modern ecological relevance of understanding photosynthesis is evident in the impact of global warming is unpinned by such phenomena as coral bleaching.2 A reductionist view on photosynthesis is the storage of electrochemical potential by intra-cellular membranes. Small angle neutron scattering (SANS) is non-destructive structural probe, albeit of low information content, suitable for monitoring aspects of photosynthetic membrane organization in vivo in actively metabolizing cells. Information in SANS patterns is typically extracted by comparison of patterns with a model calculation by linear least squares fits. Real space information, for example TEM microscopy, provided a ready comparison with the reciprocal space SANS derived model consisting of stacks of bilayer enclosed compartments.3 When constrained by other sources of information modelling of SANS data is a convenient method for verifying structural hypothesis based on real space models of cell membrane organization. Here we report on SANS as a general method for analysis of bilayer organization in photosynthetic Symbiodinium algae, both in hospice in coral and anemone polyps, and isolated.

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2. Sully, S.; Burkepile, D. E.; Donovan, M. K.; Hodgson, G.; van Woesik, R., A global analysis of coral bleaching over the past two decades. Nat. Commun. 2019, 10 (1), 1264.
3. Nallet, F.; Laversanne, R.; Roux, D., Modeling x-ray or neutron-scattering spectra of lyotropic lamellar phases - interplay between form and structure factors. J. Phys. II 1993, 3 (4), 487-502.

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Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Health & Life