Abstract

Radical pairs and molecular triplet states play important roles as both functional intermediates and reporters of local structure in photosynthetic proteins. These species can be studied using a variety of magnetic resonance spectroscopy methods including time resolved EPR and optically detected magnetic resonance (ODMR). We use these techniques to study how photosynthetic bacteria adapt to environments in which there is little or no visible light available. Heliobacteria live in anoxic soil environments and use bacteriochlorophyll g as their main pigment. This chlorophyll absorbs in the near infrared at ~800 nm but is sensitive to oxygen. Cyanobacteria on the other hand perform oxygenic photosynthesis and live in a variety of light conditions. Recently, it was discovered that some species of cyanobacteria are able to adjust their photosynthetic pigments and produce chlorophyll f instead of chlorophyll a when only far-red light is available [1].

In the seminar an introduction to time-resolved EPR and ODMR will be given to show how light-induced electron spin polarization can be used to study triplet states and radical pairs. Then, some of our recent results on reaction centre proteins from heliobacteria and on the chlorophyll f synthase enzyme from cyanobacteria will presented.

References

[1] Gan, F.; Zhang, S.; Rockwell, N. C.; Martin, S. S.; Lagarias, J. C.; Bryant, D. A.

Extensive Remodeling of a Cyanobacterial Photosynthetic Apparatus in Far-Red

Light. Science 2014, 345 (6202), 1312–1317.