

# FTIR Difference Spectroscopy for the Study of Photosystem I from *Chroococcidiopsis thermalis* PCC 7203 Cells Grown Under Far-Red and White Light

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Photosystem I (PSI) is a membrane protein complex in oxygenic photosynthesis that mediates photoinduced oxidation-reduction in the thylakoid membrane. Certain types of cyanobacteria adapt and grow under far-red light, where a small fraction of chlorophyll *a* (Chl *a*) in PSI is replaced by chlorophyll *f* (Chl *f*) through a process called far-red light photo acclimation (FaRLiP). The absorption maximum of Chl *f* is around 740 nm, making photosynthesis possible using lower-energy, far-red photons.

Here we are studying PSI from *C. thermalis* cells grown under far-red light (FRL) and white light (WL). FTIR difference spectra (DS) shows vibrational bands associated with both neutral and oxidized P700. Time-resolved FTIR DS experiments show distinctly different kinetics for FRL- and WL-PSI, suggesting modified charge-separation dynamics. Photo accumulated and time-resolved FTIR DS reveal distinct features associated with P700<sup>+</sup> and A<sub>1</sub><sup>-</sup> formation that allow a comparison of the structure of these pigments in FRL- and WL-PSI.

**Keywords:** Photosystem I, chlorophyll *f*, far-red light, *Chroococcidiopsis thermalis*, FTIR difference spectroscopy.