Abstract Submitted
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FTIR Difference Spectroscopy for the Study of Photosystem I A_1 Acceper NAN ZHAO, GARY HASTINGS — Photosystem I (PS I) is a protein complex which carries out light-induced charge separation in oxygenic photosynthesis. Phylloquinone acts as the secondary electron acceptor in PS I. The A_1accepter is of interest because it has the lowest reduction potential of any quinone found in nature. In *Men*B mutant PS I particles from *Synechocystis* sp. 6803, a plastoquinone-9 molecule occupies the A_1 binding site instead of phylloquinone. Using *men*B PS I particles, it has been shown that it is possible to replace plastoquinone-9 in the A_1 site with phylloquinone. To probe the molecular properties of phylloquinone and its environment in both the neutral and reduced state, we have used time-resolved step-scan FTIR difference spectroscopy (TRSS FTIR DS) to supply dynamic structural information concerning the electron-transfer cofactor. We have produced time-resolved A_1^-/A_1 FTIR DS using *men*B mutant PS I particles in which phylloquinone has been reintroduced into the A_1 binding site. We also have obtained time-resolved A_1^-/A_1 FTIR difference spectra for *men*B PS I particles that are globally ^{13}C labeled where ^{12}C labeled phylloquinone was incorporated into the A_1 binding site. By incorporating ^{12}C labeled phylloquinone into ^{13}C labeled PS I, we are able to identify carbonyl (C=O)-sensitive bands of A_1^- and A_1.

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