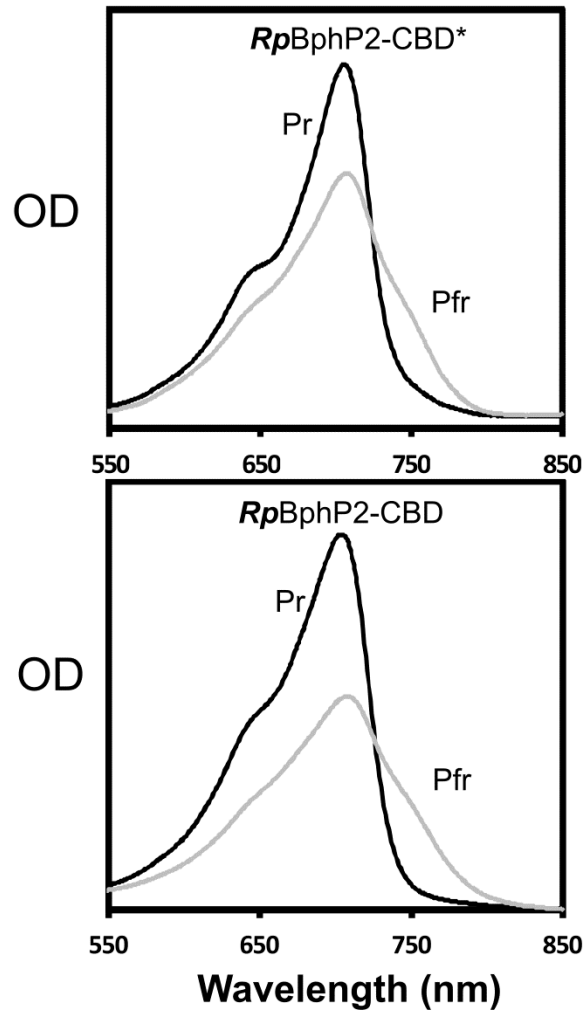


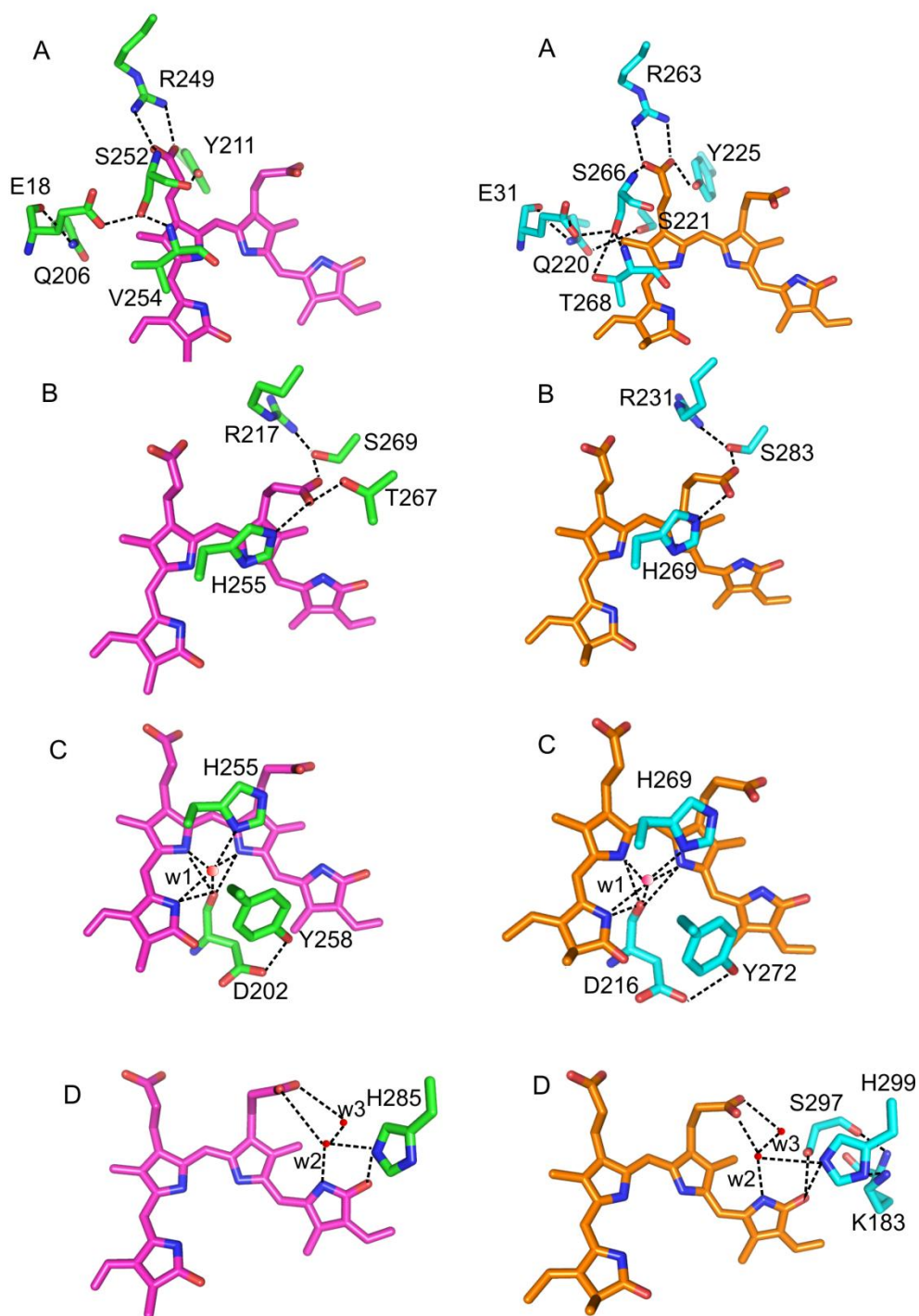
Supplementary Material

Supplementary Figure 1



Supplementary Figure 1. Photoconversion spectra for (a) *RpBphP2-CBD** and (b) *RpBphP2-CBD*. Black curve is Pr and the gray curve is the mixed Pfr/Pr state; this is a mixture of states due to overlap of Pr and Pfr bands in the red part of the spectrum resulting in an incomplete photoconversion on illumination. Incomplete photoconversion is seen in all constructs, including the full length.

Supplementary Figure 2



Supplementary Figure 2. The four clusters of hydrogen bonding networks in the BV pocket, (a) – (d). Green is *RpBhpP2-CBD** and cyan *RpBhpP3-CBD*. (a) at the B ring propionate, (b) at the C ring propionate, (c) at the pyrrole nitrogen atoms and (d) at the D ring carbonyl. Water molecules are labelled w1, w2 and w3.