POINT MUTATION CHANGES VIBRATIONAL COUPLING IN LEPIDIUM VIRGINICUM WATER SOLUBLE CHLOROPHYLL BINDING PROTEIN

GALINA GRECHISHNIKOVA, AMIT SRIVASTAVA, SAFA AHAD, MIKE EARL REPPERT, LIBAI HUANG, *Department of Chemistry, Purdue University, West Lafayette, IN, USA*.

Low temperature photoluminescence spectroscopy (PL) revealed a change in vibrational coupling of mutated Water soluble chlorophyll binding protein complexes (WSCPs) with Chlorophyll a. Pigment-protein systems can adjust the range of absorbed wavelengths according to living conditions. However, the mechanism of spectral tuning is unclear. A study of point mutations in the Q57 site of the Lepidium virginicum (Lv) WSCP is expected to shed light on how hydrogen bonds and electrostatic interactions influence the emission spectrum of Chlorophyll a (Chl a) bound to WSCP. Steady state PL revealed the change of the electron-phonon coupling strength within the mutants at 7 K. Time-resolved (TR) PL detected the difference in the lifetimes of the WSCP mutants at 7 K. Both PL and TRPL results cannot be ascribed to the charge difference in the Q57 site of Lv WSCP alone. The influence of hydrogen bonding together with electrostatic interactions and geometry changes should be considered to correctly describe the mechanism of tuning of vibrational coupling in WSCP bound with Chl a complex.