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Excitation and entanglement dynamics of light harvesting complex II B850 ring SHU-HAO YEH, JING ZHU, SABRE KAIS, Department of Chemistry, Purdue University, West Lafayette, IN 47907 — The electronic excitation and the entanglement dynamics between the chromophores of photosynthetic harvesting complex II (LHCII) B850 ring have been studied and analyzed theoretically. Since the coupling energy between the adjacent chromophore electronic excitation is comparable to the bath organization energy, the modified scaled hierarchical equation of motion (HEOM) approach is implemented to treat the whole system in an intermediate coupling regime. Comparing our results to the well-studied Fenna-Matthews-Olson (FMO) protein, we found that quantum coherence of electronic excitation between chromophores also exist in this system at the same temperature level (77K), which also suggests that the excitation energy transfer coherently through the B850 ring instead of incoherent hopping. The calculation of bipartite entanglement between chromophore electronic excitation shows the existence of a long-lived entanglement in this system, illustrates that this kind of quantum effect could survive even in such a noisy environment.

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