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Raman Spectroscopy of Oxygen Evolution Catalysts and PSII Manganese Model Compounds

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ABSTRACT

Photosynthesis is the basis of life on earth, and oxygen evolution catalysts are key components of this complicated, yet not fully understood process. Photosystem II, a large membrane bound pigment-protein complex, is the key system that facilitates oxygenic photosynthesis via the oxygen evolving complex (a natural oxygen evolving catalyst). It is a key component in oxygen producing catalysts, which can be used in fields such as energy production and biomimetic catalysts. The oxygen evolution cycle, or Kok cycle going within it is still not studied completely. In this project, we were studying the vibrational (and structural) state of a Manganese model compound for PSII and functioning Ruthenium water oxidizing catalyst. The method for this experiment was Raman spectroscopy at two wavelengths in the visible region: 532nm and 442nm. The results obtained from our Manganese model compound are various Raman spectra which will be analyzed using DFT (Density Function theory) and can now be used to predict vibrations relevant to PSII while insights gained from functioning Ruthenium water oxidizing catalysts give clues to the chemistry of PSII.

KEYWORDS

Photosynthesis, Energy, Biomimetics, Oxygen Evolution, Catalysts