# POSSIBLE MOLECULAR EVIDENCE FOR OXYGENIC PHOTOSYNTHESIS IN 2.7 GA BANDED IRON FORMATIONS

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Banded iron formations (BIFs) are marine sedimentary rocks made of alternative iron-rich (~20-40 wt% Fe) and siliceous (~40-60 wt% SiO2) bands. BIFs have received great research interest due to their bearing of records of the early Precambrian evolutions of atmosphere, ocean and biosphere. There are multiple lines of evidence suggested that oxygenic photosynthesis might have emerged somewhere between 3.5 to 2.5 Ga but none is confirmative. In contrast to the extensive studies on the mineralogy, petrology and inorganic geochemistry of BIFs, the organic matters in BIFs were poorly understood because of their extreme low contents. The functional group information of organic molecules in BIFs would be lost during the long sedimentary and metamorphic evolutions. By using *in situ* Raman spectroscopy, we have measured rich characteristic Raman peaks from BIF samples in the wavelength range between 1200 and 1600 cm-1, which are assigned to the vibrational models of organic molecules. Some of the Roman bands could be interpreted to signature Raman peaks of scytonemin, a common cyanobacterial UV-screening pigment that could be considered as the biomarker of oxygenic photosynthesis. We suggest that the identification of scytonemin in ~2.7 Ga BIF sample could serve as a biochemical evidence for the emergence of oxygenic photosynthesis at that time.