Exp. number : 2020D6003 (8 hrs)

BL5S1

Identifying structural characteristics of reassembled protein nanoparticles.

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Keywards : Fe, Cu, XANES, EXAFS

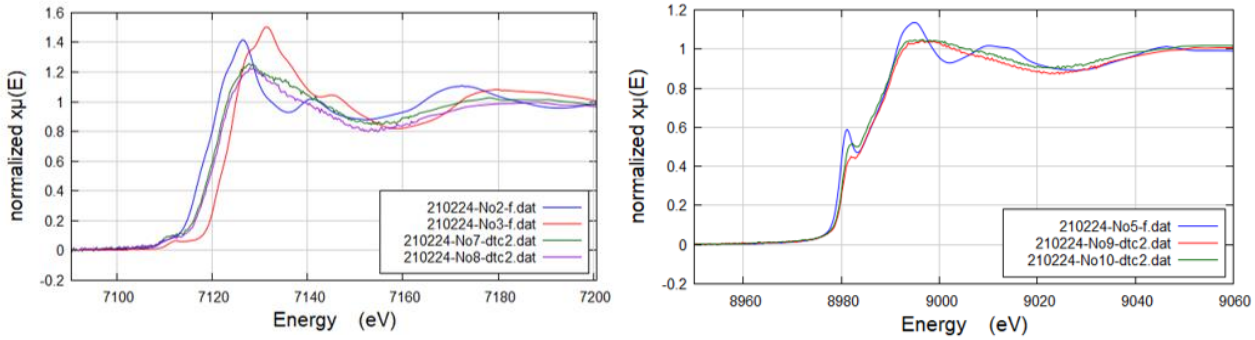
1. Introduction

Native MMO is an industrially promising enzyme owing to its significant potential impact on the future of industrial biomanufacturing. Despite potential importance, the low cell productivity and low MMO yield of methanotrophs has been a major obstacle for the research. To overcome this obstacle, we attempted a molecular design for structural and functional mimicry of sMMO/AMO and eventually succeed in high-yield synthesis of a catalytically active, novel sMMO and cAMO particles in *E. coli.* In this work, we are trying to confirm the nuclearity of Fe and Cu ions of the synthesized sMMO and cAMO

2. Experiments

sMMO3(B), sMMO3(A), cAMO(B) and cAMO(A) were prepared as a freeze-dried powders. These samples were analyzed at the Aichi Synchrotron center in order to confrim the nuclearity of Fe and Cu ions in the synthesized sMMO-mimics and cAMO-mimics. The collected XANES and EXAFS data were analyzed by using *Athena* software.

3. Results & Discussion



(No.2: FeO, No.3: Fe_2O_3, No.7/No.8: Reassembled protein nanoparticles; No.7: sMMO3(B), No.8: sMMO3(A))
(No.5: Cu_2O, No.9/No.10: Reassembled protein nanoparticles; No.9: cAMO(B), No.10: cAMO(A))

The absorption peaks of XANES spectra of sMMO3(B) and sMMO3(A) in Figures for sMMO show a little difference. Likewise, the XANES spectra of cAMO(B) and cAMO(A) in Figures for cAMO show a little difference. The signal intensities of the experimental data are not so good because the concentrations of Fe ions are not sufficient for the experiment. And cAMO is appeared at the similar absorption energies compared with our last experimental sample pMMO and cMMO.

4. References

1. Smith, et al., *Biochemistry* (2011), 50, 10231−10240
2. Lieberman, et al., *Inorg Chem*. (2006), 45(20): 8372–8381