Crystal structure analysis of Hmc

Naoki Shibata (3018), Kyoko Suto (3016), Yukio Morimoto*(3007) and Noritake Yasuoka (3009)

Faculty of Science, Himeji Institute of Technology
Kanaji, Kamigori, Ako, Hyogo 678-1297, Japan

High molecular mass cytochrome c_3 (Hmc) from *Desulfovibrio vulgaris* Miyazaki F is an electron transfer protein composed of a single polypeptide and 16 heme *c* groups (total molecular weight is 67 kDa). Primary and tertiary structures of Hmc have not been reported but Hmc may have four cytochrome c_3 domains since the primary structure of Hmc from Hildenborough strain indicates that Hmc is divided into four cytchrome c_3 units.

The function of Hmc *in vivo* remains unclear but the protein must transport electrons because cytochrome c_3 is an electron transfer protein. Redox potentials of heme groups are from positive (E = 60 mV) to negative (E = -260 mV), which cover the redox potentials of other electron transfer proteins, such as cytochrome c_3, cytochrome c_{553}, ferredoxins I and II, and rubredoxin. Hmc may receive electrons from hydrogenase.

Data sets for native crystals were collected at BL41XU equipped with the Rigaku R-AXIS IV imaging plate detector system. A wavelength of an incident beam was 0.708 Å and a crystal-to-detector distance was 400 mm. The crystals diffracted to 3.0 Å for the first frame, but we could not complete the data collection because of immediate radiation damage of Hmc crystals.

The image data were processed by using the programs *DENZO* and *SCALEPACK*. The programs indicates that the crystals belong to an orthorhombic space group of $P2_12_12_1$ with unit cell dimensions of a=60.5 Å, b=85.2 Å, c=127.6 Å.

The crystals subjected to the data collections were weak for radiation damage. We have searched new crystallization conditions to improve the quality of the crystals and then we have obtained a new Hmc crystal using a precipitant solution containing 20 % glycerol. It may improve the quality of the crystals and we will collect a complete data set at 100 K using the new crystal. We hope we can complete the data collection at SPring-8 using the new crystals if the occasion arises.