



第 162 回触媒化学研究センター談話会

演題 : Application of Surface Enhanced Infrared Difference Absorption Spectroscopy to the study of protein monolayer

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日時 : 平成 16 年 1 月 7 日 (水) 15 : 00 ~ 16 : 00

場所 : 創成科学棟 大会議室 (5階 05 - 213)

講演内容 :

Monolayers of proteins participating in biological electron transfer reactions are very attractive for detailed biophysical investigations of the intermolecular electron transfer within the native cell. The electrochemically induced oxidation and reduction process of cytochrome c (cyt c) is regarded as one of the most suitable model systems for such a study. We present an application of infrared (IR) spectroscopy for the in-situ study of the redox process of a cytochrome c monolayer on a gold electrode.

IR difference spectroscopy is a very powerful method to resolve the structural dynamics of proteins on the atomic level. However, conventional IR spectroscopy suffers from sensitivity too poor to detect the minute spectral changes from monolayer. To overcome this difficulty, we employ Surface Enhanced Infrared Difference Absorption (SEIDA) spectroscopy. With this technique, the IR signal from the adsorbed cyt c monolayer is enhanced several hundreds fold as compared to the conventional IR method.

The acute sensitivity of SEIDA's leads not only to the detection of the minute conformational changes of cyt c during the redox process but the influence of the chemical nature of the surface modifier is also probed. We also succeeded to perform time-resolved FT-IR difference spectroscopy in the micro-second domain on such monolayer. This provides detailed information on the dynamics of the electron transfer of the protein.

Finally, it is noted that the SEIDA technique can be generally employed in functional studies of natural membranes and the incorporated proteins.

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