특별강연

Introduction to a New In-Situ ATR-FTIR Technique
새로운 적외선분광기법의 소개

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A new thin electrolyte layer ATR-FTIR technique developed recently in National Research Council of Canada will be described in detail in terms of its experimental setup, sensitivity and applications.

Most of In-Situ FTIR studies has been performed using external reflection FTIR methods or thin film electrode ATR-FTIR methods. The external reflection FTIR method uses specular IR reflection at a mirror-like electrode surface that is pushed against an IR transparent window leaving an electrolyte layer of 1 to 6 micrometers in the gap, and thus its application is limited to the mirror-like surface.

The thin film electrode ATR-FTIR method, known as the Kretschmann configuration, employs a thin film electrode deposited on an ATR crystal. Since an evanescent wave (a form of standing wave generated at the reflected position) should pass through the thin electrode to touch the species on the electrode surface, the electrode on ATR crystal should be prepared carefully as the forms of extremely thin or porous type which limit its wide applications.

A thin electrolyte layer ATR-FTIR technique, known as the Otto configuration, has been developed recently and tested experimentally in NRC. The experimental results showed that the new technique can give better sensitivity than the conventional FTIR techniques, and it can be applied to the electrochemical studies of any kind of electrode materials including IR non-reflecting or IR absorbing materials. In this presentation, the experimental setup and new experimental findings using a thin electrolyte layer ATR-FTIR technique will be presented in view of the water dipole arrangement, CO adsorption/desorption and methanol oxidation mechanisms on the planar and porous electrode surfaces, and its application will be discussed.