ATR-far-ultraviolet spectroscopy: a challenge to new σ chemistry

ATR-far ultraviolet (FUV) spectroscopy in condensed phase enables one to investigate various topics in physical chemistry, analytical chemistry, nanoscience and technology, materials science, electrochemistry, and organic chemistry. I would like to talk following three major topics: (1) Studies of electronic transitions and structure of a variety of molecules, which one cannot investigate by ordinary UV spectroscopy. Using ATR-FUV spectroscopy in combination with quantum chemical calculations it is possible to explore not only π–π* and n–π* but also n–σ* and σ, n–Rydberg transitions. ATR-FUV spectroscopy may open a new avenue for σ-chemistry. (2) ATR-FUV spectroscopy enables one to measure the first electronic transition of water at around 160 nm without peak saturation. Using this band, one can study electronic structure of water, aqueous solutions, and adsorbed water. (3) ATR–FUV spectroscopy has its own advantages of ATR method as a surface analysis method. ATR-FUV spectroscopy is a powerful method for exploring a variety of top surface phenomena (～50nm) of adsorbed water, polymers, graphene, organic materials, ionic liquids, and so on.