**Application of IR spectroscopy to study thin films of biomolecules at the electrified metal-solution interface**

**Jacek Lipkowski,**

**Department of Chemistry, University of Guelph, Ontario N1G 2W1, Canada**

After a brief review of basic principles of the laws of reflection of light at interfaces, three methods of Infrared Reflection Absorption Spectroscopy (IRRAS) at electrified metal-solution interface will be discussed. The first is the subtractively normalized interfacial Fourier transform infrared spectroscopy (SNIFTIRS) or in short potential difference IR spectroscopy. This technique finds application to study reversible adsorption of soluble molecules at electrode surfaces. Its principle will be described and methods of optimisation of the SNIFTIRS experiment will be discussed. Its application will be illustrated by the case of adsorption of adenine (a pyrimidine base) a gold electrode surface. The second technique to measure IR spectra at interfaces is the photon polarization modulation infrared reflection absorption spectroscopy (PM IRRAS). This technique is used to study films of insoluble molecules at various interfaces. I will discuss application of this technique to study model biological membranes containing antibiotic peptides supported at a gold electrode surface. The third technique is surface enhanced infrared reflection absorption spectroscopy (SEIRAS). I will describe principles of this method and will illustrate its application to study water structure in a model membrane supported at a gold electrode.