

# Solid-liquid Interfaces: a new Surface Science frontier

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Over the past century the science of material surfaces has undergone enormous progress. The atomic and electronic structure, the reactivity, and the dynamics of many solid-vacuum, solid-gas and solid-liquid interfaces have been uncovered. This progress has been propelled by the continuous development of ever increasingly powerful techniques that provide atomic and molecular level details of surfaces, adsorption, reactions and desorption phenomena, and vibration and electronic spectra using electron and photons, and by imaging techniques including diffraction of electrons and x-rays, and by Scanning Tunneling and Atomic Force Microscopies. Many of these techniques operate best in ultra-high vacuum environments, often under cryogenic temperature to achieve measurable amounts of weakly bound adsorbates. And yet, practical surfaces are surrounded by gases and liquids at ambient conditions of pressure and temperature. Today, several new techniques and methods have been developed that removed these technical constraints. It is now possible to study in unprecedented detail interfaces that play decisive roles in atmospheric science, in energy storage (batteries), electro- and photoelectron-chemistry, and many others that are at the heart of modern technologies.

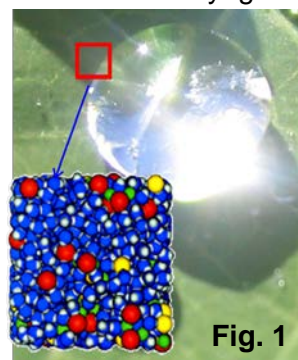


Fig. 1

We have made a number of discoveries about the chemical nature and the structure of liquid surfaces and interfaces. In this presentation I will review the progress in liquid interface research in my laboratory, covering topics such as the melting of ice when the temperature approaches that of the triple point<sup>1</sup>, the segregation of ions to the surface of droplets of saline solutions (Fig.1), of importance in atmospheric chemistry<sup>2</sup>, and the growth of ice on metal surfaces<sup>3,4,5</sup>. More recently we have undertaken studies of solid-liquid interfaces in electrochemical environments to clarify with element sensitive spectroscopic methods the chemical and structural nature of the electrical double layer (Fig.2).

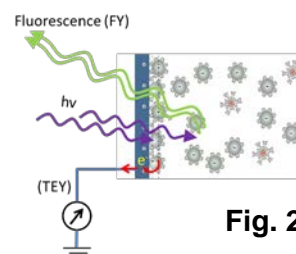


Fig. 2

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