

Abstract template:

**Title**

SFG Spectroscopy of the Aqueous Interface: Ionic and Soluble Molecular Solutions

**Reference**

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**Abstract**

The liquid interface of aqueous solutions is of central importance to numerous phenomena from cloud processing of combustion generated oxides to corrosion degradation of structural materials to transport across cell membranes. Recently, the nonlinear spectroscopic method, sum frequency generation (SFG), has been applied to investigate the structure of liquid interfaces and alteration of that structure by materials in solution. This chapter focuses on two categories of materials in solution: inorganic ionic materials that are nonvolatile –  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ , alkali sulfates and bisulfates,  $\text{NaCl}$ , and  $\text{NaNO}_3$  – and soluble molecules that are volatile –  $\text{HCl}$  and  $\text{NH}_3$ . Ionic materials influence the structure of water at the interface through an electric double layer that arises from the differential distribution of anions and cations near the interface. Two models for the effect of the double layer are discussed. Soluble molecular materials of lower surface tension partition to the interface and displace surface water molecules. Ammonia is a rather unique probe of water at the surface. At low concentrations, ammonia merely docks to the dangling-OH groups. At intermediate concentrations, the surface changes little as the bulk concentration increases and at higher concentrations, ammonia blankets the surface and displaces water at the surface.