

## Preface

At the time I began my PhD research, more than thirty years ago, surface chemistry involved “putting things on top of other things” in ultrahigh vacuum. Most papers in the field involved the adsorption of simple gases, favorites being CO, NO, or O<sub>2</sub>, onto well-defined crystal faces of metals, such as Pt(111), Ni(100), or W(110). Analytical techniques were those that allowed structural and chemical analysis of such systems (e.g. low-energy electron diffraction, Auger spectroscopy, and X-ray photoelectron spectroscopy), and some means to measure bond energies to the surface (thermal desorption, for instance). The liquid-solid interface was rather neglected at that time, and the solid-solid interface hardly mentioned in polite company.

In the subsequent decades, the field has been transformed by new developments, both in instrumentation and in chemistry. Scanning-probe methods have not only made access to the nanometer scale far easier (and in real space) but, together with new spectroscopic methods, they have also brought surface science out of the vacuum. With improved ways of looking at liquid-solid interfaces on small scales, a bridge has been built to areas of technical importance such as corrosion and tribology, as well as to biology and hence to medicine. At the same time, developments in surface-chemical functionalization have meant that it has become increasingly feasible to modify, or tailor, the surfaces of materials with molecular precision outside of the vacuum in myriad different ways and for a vast array of applications.

I have had the pleasure of participating in this vibrant environment, as surface chemistry has broadened towards many other disciplines, and become central to a host of developments in medicine, semiconductors, chemical manufacturing, and many other technologies. In this book I have tried to convey the flavor of that development, through examples from my own work in surface functionalization, catalysis, tribology, and biointerfaces.

*Nicholas D. Spencer*  
Zurich, Switzerland  
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