

In-Situ Scanning Probe Microscopy: Past and Present

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It remains one of the most important tasks of modern, physical electrochemistry to develop an atomistic picture of the electrode/electrolyte interface in order to provide the basis for a mechanistic understanding of electrochemical processes. Despite highly sophisticated electrochemical techniques that have been developed over the years, and despite the routine use of single crystal electrodes in such studies, the lack of detailed structural information has always been considered to be a major obstacle. This situation changed dramatically with the advent of in-situ X-ray diffraction techniques and of in-situ scanning tunneling microscopy (STM). The invention of the STM enabled electrochemists to study the structure of electrode surfaces in-situ, in real space and often with atomic-scale resolution. It opened the route to structure information of hitherto unprecedented precision and detail.

The lecture will start with a brief review of the past 15 years of in-situ SPM, and continues with a survey of the more recent achievements in imaging bare and adsorbate-covered electrode surfaces. Highlights and pit falls of SPM are briefly addressed.