

Abstract: K3

Spatiotemporal self-organization during the anodic electrodisolution of silicon in ammonium fluoride solution

*Iljana Miethe and Katharina Krischer
Physik-Department E19a, Technische Universität München, Germany*

The anodic oxidation of silicon in an HF-containing electrolyte is technologically of great importance and therefore intensively studied. Yet, many aspects of electrochemical silicon dissolution are only poorly understood. This is especially true for current oscillations which are observed when applying a comparatively high anodic voltage and which result from an interplay of electrochemical oxidation of the silicon surface to silicon oxide and chemical etching of the developing oxide.

In the talk, I will discuss in situ measurements carried out with an ellipso-microscope that allowed us to measure the oxide layer thickness with spatial and temporal resolution. The measurements revealed important information about the nature of the oscillatory instability, and they showed that in some parameter regimes the oscillations are accompanied by spatial pattern formation. I will discuss the role different physical and chemical quantities, such as the electric field in the oxide layer, or the oxide layer thickness, play in an oscillation mechanism. Furthermore, I will analyse the observed patterns from a dynamical point of view and extract the spatial coupling mechanisms that are responsible for their occurrence.