

FRAUNHOFER INSTITUTE FOR SILICATE RESEARCH ISC

## THIN FILM ANALYSIS – INSIDE AND ON TOP

### Introduction

The right materials define an excellent product. In contrast, material damages or incompatibilities can affect production processes, customer relations and can become a major cost driver. With our more than 50 years expertise in materials analysis we support you with all these questions, propose solutions to optimize materials and processes or even bring up entirely new ideas for novel products.

### We offer

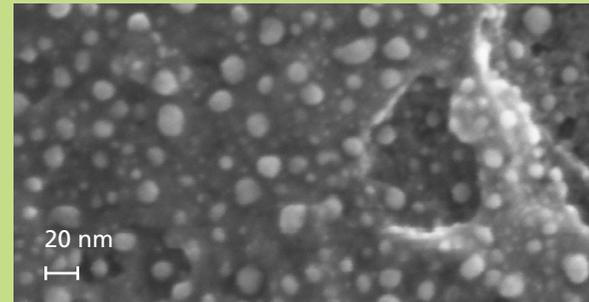
The Center for Applied Analytics offers an extensive portfolio of advanced techniques to characterize thin films and surfaces consisting of glass, ceramics, metals or (hybrid) polymers. A smart combination of different methods leads to better results placed into an overall context. For example, we analyse the chemical composition, the surface topography, the electrical conductivity and mechanical properties, the inner structure of thin films and the interface between film and substrate. Thus, we are able to scan the material of thin films outside, inside and on top.

### Methods for possible thin film analysis

- ATR IR spectroscopy, micro RAMAN or micro IR spectroscopy to analyse molecular composition and functionalization of surfaces
- Scanning electron microscopy (SEM) in combination with different special detectors to analyse the topography of surfaces, the microstructure, the element composition and the electrical conductivity
- Special micromanipulators in combination with SEM to analyse electrical conductivity or mechanical properties on the microscale
- X-ray photoelectron spectroscopy (XPS) to analyse surface and interface chemistry, diffusion profiles, corrosion or oxidation effects and functionalization of surfaces
- Transmission electron microscopy (TEM) to analyse bulk microstructures down to the atomic scale
- Cross Section Ion Beam Preparation (cryo-CSP) to prepare large cross sections of any materials for following analysis
- XRF and/or inductively coupled plasma optical emission spectroscopy (ICP-OES) to analyze bulk chemistry, hydrolytic resistance and leaching

The Center for Applied Analytics is accredited to DIN EN ISO/EC 17025 and also as RAL/EUCEB laboratory testing for mineral wool.

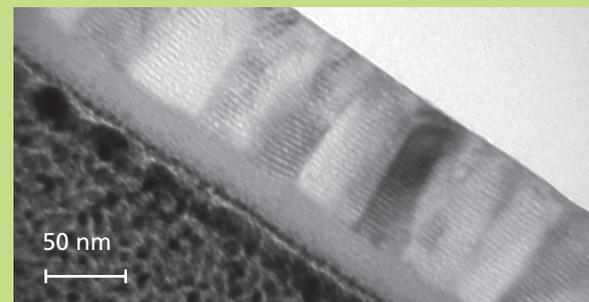
Chemical and microstructure analysis of surfaces with SEM and XPS



Measurement of electrical conductivity with special micromanipulators



Analysis of 30 thin films with TEM



Analysis of interface between layer and substrate with TEM

