

SEMINAR I

Thursday, 09.4.2026, 13:20, MPŠ lecture room

Closed loop autonomous experimentation in the development of TiO₂ nanotube catalysts

Vinko Longar, MPŠ

TiO₂ nanotube catalyst development is limited by the complexity of its main synthesis route, the anodic oxidation, which presents a large number of interacting synthesis parameters, and slow connection between synthesis, characterization, and application testing. This seminar examines how digital transformation, machine learning, and autonomous experimentation can accelerate this process by converting the workflow into a structured, data-rich, and machine-readable system. The proposed approach follows a staged progression from anodic oxidation, to electrochemical characterization, and finally to degradation experiments with UPLC analysis. A transfer learning pipeline is suggested to connect these stages, enabling knowledge to be transferred from synthesis data to characterization and then to application performance. The main conclusion is that the immediate priority is to build reproducible and traceable workflows that can support future closed-loop autonomous discovery of TiO₂ nanotube catalysts.

Kindly invited.