

Metal-Ion-Modified Calcium Silicate Hydrates as Functional Inorganic Materials for Adsorption and Catalysis

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Abstract

In this seminar, I will briefly introduce Kaunas University of Technology, the Faculty of Chemical Technology, its study programmes, and research activities carried out at the Department of Silicate Technology. The main focus will be on our work related to calcium silicate hydrates (CSH), their hydrothermal synthesis, structural characterization, and modification with transition metal ions. CSH are traditionally known as important cement-related phases; however, our research aims to expand their application towards functional materials for environmental technologies. I will present how metal-ion modification affects the formation, porosity, thermal stability, and surface properties of CSH-based materials, and how these materials can be applied in catalytic processes, especially VOC oxidation. The seminar will also highlight the broader research direction of transforming conventional silicate materials into multifunctional systems for adsorption, catalysis, sustainable binders, and circular economy applications.

Short bio Tadas Dambrauskas is an Associate Professor at the Faculty of Chemical Technology, Kaunas University of Technology, Lithuania. He received his PhD in Chemical Engineering in 2019. His research focuses on the synthesis, modification, and characterization of calcium silicate hydrates, calcium silicates, calcium phosphates, and related inorganic materials. He has developed research activities on hydrothermal synthesis, transition-metal-ion-modified CSH materials, adsorption processes, catalytic oxidation of VOCs, and sustainable low-CO₂ binders. He has published more than 49 scientific papers, co-authored the Springer monograph Synthetic Gyrolite, and is an inventor of Lithuanian patents related to calcium silicates and cementitious materials.

More information: <https://en.ktu.edu/scientist/tadas.dambrauskas/>