# O 57: Poster Session - Surface Dynamics: Phase Transitions and Elementary Processes

Time: Tuesday 18:15–20:00 Location: P2/2OG

O 57.1 Tue 18:15 P2/2OG

**Phase transitions in geometrically disordered porous solids: from strong to weak disorder** — •Henry R. N. B. Enninful, Dirk Enke, and Rustem Valiullin — Universität Leipzig, Leipzig, Germany

Mesoporous solids are widely used in various applications in catalysis, separations, adsorption, drug delivery, gas and energy storage, among others. Establishing their pore structure is therefore of direct practical relevance. While the state-of-the-art characterization approaches perform extremely well for ordered mesoporous solids, the occurrences of the cooperativity effects in phase transitions coupled with very complex morphological structures of the pore networks make these approaches not directly applicable for disordered materials. In this respect, better understanding of phase equilibria is needed.

In this contribution, we discuss the potentials of a recently developed serially connected pore model (SCPM) which intrinsically contains both the cooperativity effects and structural complexity. Notably, the governing equation derived within SCPM may be considered as an extension of the general adsorption isotherm (GAI) equation to include the network effects. We show the freezing and melting transitions (analogues of capillary evaporation and capillary condensation, respectively) complemented by the freezing scanning behavior (analogue of capillary evaporation scans) for a family of porous glasses with different pore sizes.

References [1] Scientific Reports, 7, 7216, 2017. [2] JPCC C, 123, 16239, 2019 [3] Frontiers in Chemistry, doi: 10.3389/fchem.2019.00230.

O 57.2 Tue 18:15 P2/2OG

**Oxide formation during heat treatment of stainless steel AISI 446** — •Simon Homann[1,2], Cornelia Strauss[1,2], and Wolfgang Maus-Friedrichs[1,2] — [1]Institute of Energy Research and Physical Technology, Leibnizstraße 4, 38678 Clausthal- Zellerfeld, Germany — [2]Clausthal Centre of Material Science, Agricolastraße 2, 38678 Clausthal-Zellerfeld, Germany

Stainless steels are an important part of modern industry mainly because of their stability towards corrosion. The naturally forming oxide layer prevents a further degradation, which would otherwise lead to mechanical instability. At the same time, certain oxide layers also prevent the surface from wetting with braze used to join multiple workpieces, which is a known problem in the steel industry. The stainless steel used in this work (1.4762/ AISI 446) is a ferritic stainless chromium-steel containing aluminum (max. 3,3 at.%). Under heat treatment ($T > 450\ ^\circ C$) at normal pressure as well as typical vacuum brazing conditions (p $\sim 10^5$ mbar) this steel forms highly stable aluminum oxides which are mainly responsible for the inability to braze the workpieces. The aim of this work is to find a relationship between temperature and the formation of aluminium oxides in ultra-high vacuum (p $\sim 10^{-9}$ mbar) and to evaluate the chemical mechanism which explains the formation or lack of formation of those aluminum oxides. X-ray photoelectron-, auger- and energy dispersive x-ray spectroscopy and scanning electron microscopy were used for chemical and structural analysis.

O 57.3 Tue 18:15 P2/2OG

**Time-resolved scanning electron microscope** — •Simon Däster, Yves Acremann, and Andreas Vaterlaus — Laboratorium für Festkörperphysik, ETH Zürich, Schweiz

We develop a time-resolved SEM by energy-analyzing secondary electrons which provides a contrast mechanism for local potentials of a sample. This way, we intent to observe microwaves in electronic circuits in operando