



EINLADUNG

zum Vortrag von

Univ.Prof. Dr. Markus Mezger

Universität Wien, Fakultät für Physik, Dynamik kondensierter Systeme

Interfacial Premelting in Ice/Clay Nanocomposites

am

Dienstag, 13. Dezember 2022, um 18 Uhr

nach der Jahreshauptversammlung der CPG

Ort: Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmannngasse 5, 1. Stock

Barrierefreier Zugang: Boltzmannngasse 5, Lift, 1. Stock rechts über den Gang zum Hintereingang des Hörsaals

Abstract

At solid/ice interfaces, a premelting layer is formed at temperatures below the melting point of bulk water. This interfacial premelting layer in ice/clay nano composites was studied by quasi elastic neutron scattering and high energy X-ray diffraction. Using well defined and characterized ice/vermiculite, ice/kaolin, and ice/talc composite samples, this work bridges the gap between studies on single crystalline ice/solid model interfaces and naturally occurring soils and permafrost.

Below the melting point of bulk water, the formation of liquid water was observed. The liquid fraction is gradually increasing with temperature. Quantitative analysis of the molten fraction reveals differences in the deviation from Antonow's rule relating the interfacial free energy between ice, water, and the clays. The translational diffusion constants of the confined premelting water is strongly reduced compared to super cooled bulk water. Adjacent to charged vermiculite the lowest water mobility was observed, followed by kaolin and the more hydrophobic talc. Results are explained by the intermolecular water interactions with different clay surfaces and interfacial segregation of the low-density liquid water (LDL) component.

References:

H. Li, M. Bier, J. Mars, H. Weiss, A.-C. Dippel, O. Gutowski, V. Honkimäki, and M. Mezger, Phys. Chem. Chem. Phys. 21, 3734 (2019).

H. Li, J. Mars, W. Lohstroh, M.M. Koza, H.-J. Butt, and M. Mezger, Angew. Chem. Int. Ed. 60, 7697 (2021).