Seminar/Talk

Insights into the crystal chemistry of thermoelectric sulfides, halides and sulfochlorides

Emmanuel Guilmeau
Laboratoire CRISMAT, Caen, France

Host: Maria Ibáñez

Thermoelectricity offers a promising solution to address energy scarcity by enablingthe efficient conversion of waste heat into useful electricity. Continued research anddevelopment in this field can lead to the development of more efficient and cost-effectivethermoelectric materials, which can play a significant role in addressing the global energychallenge. The scientific challenge is here to synthesize a material in which the electrical andthermal properties are decoupled. In short, how can we develop an electrical conductor thatconducts very little heat?In this context, numerous studies have demonstrated the potential of sulfide materialsfor thermoelectric applications over the temperature range 300 – 700 K. Although mostmaterials have high thermal conductivities, recent works demonstrated that extremely lowthermal conductivities could be achieved in sulfides through order/disorder phenomena,rattling dynamics, and lattice anharmonicity.During this presentation, recent advances in synthetic sulfide minerals, halides andsulfochlorides, will be shown. Some peculiar structural features in connection with materialsprocessing, chemical bonds, lattice vibrations and atomic and nanoscale order/disorderphenomena were carefully examined to establish rules and correlations between the crystalstructures, nano-microstructures, electronic structures, vibrational and thermoelectricproperties. [1-5] References[1] P. Lemoine, G. Guélou, B. Raveau, E. Guilmeau, Angew. Chemie Int. Ed. 61 (2022)e202108686[2] K. Maji, P. Lemoine, A. Renaud, B. Zhang, X. Zhou, V. Carnevali, C. Candolfi, B. Raveau, R.Al Rahal Al Orabi, M. Fornari, P. Vaqueiro, M. Pasturel, C. Prestipino, E. Guilmeau, J. Amer.Chem. Soc. 144 (2022) 1846[3] X. Shen, K. Pal, P. Acharyya, B. Raveau, P. Boullay, O. I. Lebedev, C. Prestipino, S. Fujii, CC.Yang, I-Y. Tsao, A. Renaud, P. Lemoine, C. Candolfi, E. Guilmeau, J. Amer. Chem. Soc. 2024[4] P. Acharyya, K. Pal, B. Zhang, T. Barbier, C. Prestipino, P. Boullay, B. Raveau, P. Lemoine, B.Malaman, X. Shen, A. Renaud, B. Uberuaga, C. Candolfi, X. Zhou, E. Guilmeau, J. Amer. Chem.Soc. 146 (2024) 13477[5] Z. Zeng, X. Shen, R. Cheng, O. Perez, N. Ouyang, Z. Fan, P. Lemoine, B. Raveau, E.Guilmeau, Y. Chen, Nature Comm. 15 (2024) 3007

Friday, February 14, 2025 10:30am - 11:30am
Sunstone Bldg / Ground floor / Big Seminar Room A

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.