Graz University of Technology

Graz Advanced School of Science

PHYSICS COLLOQUIUM OF THE UNIVERSITY OF GRAZ AND
THE GRAZ UNIVERSITY OF TECHNOLOGY

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Oxide Surfaces at the Atomic Scale

Abstract:

Our understanding of metal oxides has benefitted tremendously from the application of surface science techniques. Particularly useful has been Scanning Probe Microscopy, which allows to directly inspect, and even manipulate, atomic-size defects and defect-related surface chemistry. Equally important has been the development of suitable model systems, i.e., (ultra)thin films and well-prepared oxide single crystals that allow a reliable experimental and theoretical modeling with crisp and unequivocal insights into fundamental processes and mechanisms.

In the talk, recent developments in the field will be illustrated by examples including our group's recent research results on binary and ternary metal oxides [1-4]. Emphasis will be laid on giving an overview of different aspects, such as the importance of the relationship between bulk and surface defects [5], the opportunities and the challenges of extending surface science to more complex materials and to high-pressure and aqueous environments [6].

References:
[1] R. Bliem, *et al.,* Angew. Chemie Intl. Ed., **54**, 13999 (2015)
[2] D. Halwidl, *et al.,* Nature Mater., **15**, 450 (2016)
[3] M. Setvin, *et al*., Proc. Natl. Acad. Sci., **114** E2556 (2017)
[4] M. Setvin, *et al*., Science, **359,** 572 (2018)
[5] M. Setvin, et al., Chem. Soc. Rev. **46**, 1772 (2017)
[6] J. Balajka, *et al*., Science **361**, 786 (2019)

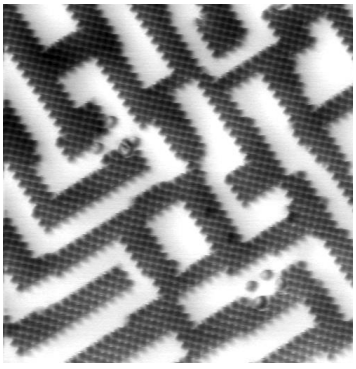

Fig.1
Atomically-resolved AFM image (20 x 20 nm^2) of the (001) surface of the ternary compound $KTaO_3$.
This self-organized, labyrinth-like structure forms to alleviate the intrinsic polarity of this system [4]. How this works, and what other paths nature is taking, will be one topic of the talk.

Date: Tuesday, October 23, 2018, 17:00

Location: Lecture Hall 05.01, Institute of Physics, University of Graz, Universitätsplatz 5

16:30 meet the speaker tea, Library of Experimental Physics,
Institute of Physics, Universitätsplatz 5, 1st floor, room 122

Host: Prof. M. Sterrer – Institute of Physics – Experimental Physics – Surface Science

For a regularly updated colloquium program see: http://www.if.tugraz.at/colloquium.html