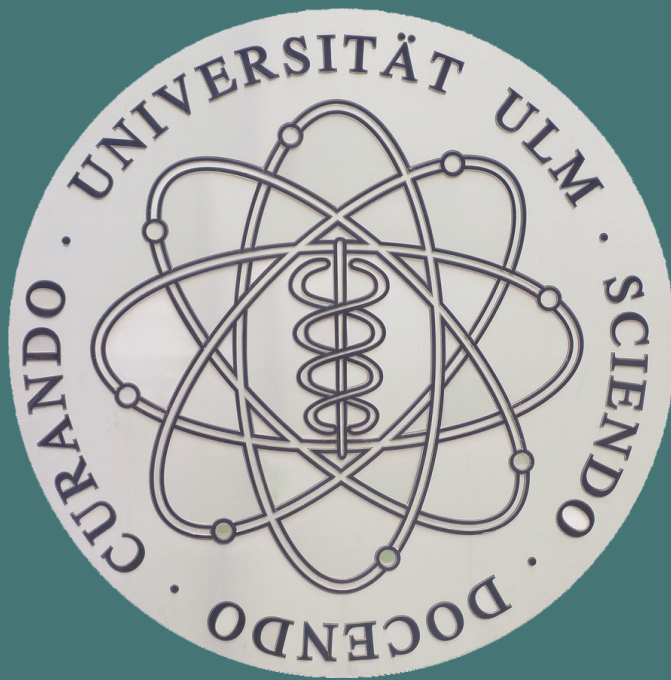


# 4<sup>th</sup> SALVE Symposium

04/2022



## Low-voltage research proceedings with contributions from:

U. Bangert, E. Besley, C. Coletti, G. Duesberg, R. Dunin-Borkowski, X. Feng, A. Ferrari, D. Gerthsen, S. Gorji, S. Haigh, L. Houben, C. Humphreys, U. Kaiser, A. Khlobystov, J. Kotakoski, A. Krasheninikov, O. Krivanek, I. Lazic, T. Latychevskaia, J. Mayer, J. Meyer, D. Muller, H. Müller, E. Olsson, T. Pichler, C. Ropers, F. Ross, C. Russo, R. Schröder, E. Spiecker, M. Stöger-Pollach, K. Suenaga, T. Susi, R. Tenne, A. Turchanin, P. van Aken, P. Wachsmuth, J. Weiss, W. Zhou, Y. Zhu

## Scientific & cultural program SALVE 2D22 April 4-7, 2022

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All talks are in M28 (TTU) lecture room, Meyerhofstrasse, 89081 Ulm

### Monday, April 4<sup>th</sup>

12:30 – 13:40 *Coming together with Coffee and Cake* (N27, Foyer)

13:40 – 13:55 *Chamber music ensemble, Muisches Zentrum UUlM,  
Cond. Manuel Haupt* (M28, TTU)

14:00 – 14:15 Thorsten Bernhardt, Dean, Faculty of Natural  
Sciences, Welcome  
Ute Kaiser, Welcome

Chair: U. Kaiser *Session 1: New Materials & Methods*

14:15 – 15:00 Andrea Ferrari, *University of Cambridge, UK*  
**Graphene and related materials, from production  
to applications**

15:00 – 15:30 Rafal E. Dunin-Borkowski, *FZ Jülich, DE*  
**Towards atomic-scale imaging of electrostatic  
potentials and magnetic fields in 2D materials  
using electron holography and electron magnetic  
chiral dichroism**

15:30 – 16:00 David A. Muller\*, *Cornell University, USA*  
**Imaging Atoms and Fields by Electron  
Ptychography**

16:00 – 16:30 Sarah J. Haigh, *University of Manchester, UK*  
**Dynamic atomic motion and chemical synthesis in  
liquids studied using our liquid cell 2D  
heterostructures and scanning transmission  
electron microscopy**

16:30 – 17:00 *Coffee break & Group photo* (N27, Foyer)

Chair: Y. Zhu *Session 2: New Instruments*

17:00 – 17:30 Martin Linck, *CEOS GmbH, Heidelberg, DE*  
**Chromatic and spherical aberration correction for  
atomic-resolution low-voltage TEM**

17:30 – 18:00 Ondrej L. Krivanek\*, *NION R&D, Kirkland, WA, USA*  
**Ultra-high energy resolution EELS in the EM**

18:30 – 19:30 *Visit of Ulm Minster with Organ music*

\* Talks performed on-line due to corona issues.

## Tuesday, April 5<sup>th</sup>, Morning Sessions

- Chair: E. Olsson      *Session 3: Low-D Materials - Synthesis, Characterization and Calculations- I*
- 9:00 – 9:30      Kazu Suenaga\*, *Osaka University, JP*  
**Electron microscopy and spectroscopy on 2D hybrid materials**
- 9:30 – 10:00      Reshef Tenne, *Weizmann Institute, Rehovot, IL*  
**Inorganic nanotubes: From WS<sub>2</sub> to "misfit" compounds**
- 10:00 – 10:30      Elena Besley, *University of Nottingham, UK*  
**E-beam Resilience of Metal Organic Frameworks**
- 10:30 – 11:00      *Coffee break* (N27, Foyer)
- Chair: E. Besley      *Session 4: Low-D Materials Synthesis, Characterization and Calculations- II*
- 11:00 – 11:30      Jannik C. Meyer, *Eberhard Karls University of Tübingen, DE*  
**Atom-by-atom chemical identification in presence of noise and residual aberrations**
- 11:30 – 12:00      Georg S. Duesberg, *Universität der Bundeswehr München, DE*  
**Advances on polycrystalline films of Transition Metal Dichalcogenides for electronic applications**
- 12:00 – 12:30      Xinliang Feng, *TU Dresden, DE*  
**Advances in Organic 2D Crystals**
- 12:30 – 13:30      *Lunch* (N27, Foyer)

\* Talks performed on-line due to corona issues.

## Tuesday, April 5<sup>th</sup>, Afternoon Sessions

- Chair: C. T. Koch      *Session 5: In-situ TEM of low D materials*
- 13:30 – 14:00      Frances M. Ross, *MIT, Cambridge, USA*  
**Strategies for local control of the properties of the 2D layered magnet CrSBr**
- 14:00 – 14:30      Eva Olsson, *Chalmers, Gothenburg, SE*  
**In situ TEM studies of strain induced changes in electrical, optical and structural properties**
- 14:30 – 15:00      Erdmann Spiecker, *Universität Erlangen-Nürnberg, DE*  
**4D Scanning Confocal Electron Diffraction (4D-SCED): A dose-efficient technique for studying structural evolution in organic 2D materials and thin films**
- 15:00 – 15:30      Andrei N. Khlobystov, *University of Nottingham, UK*  
**Chemistry of individual molecules through the lens of a transmission electron microscope**
- 15:30 – 16:00      *Coffee break* (N27, Foyer)
- Chair: J. C. Meyer      *Session 6: SEM-STEM of low-D materials*
- 16:00 – 16:30      Jon K. Weiss, *TESCAN, Tempe, AZ, USA*  
**Application-driven Instrument Design for Next-Generation Nanocharacterization Tools**
- 16:30 – 17:00      Dagmar Gerthsen, *KIT, Karlsruhe, DE*  
**Minimization of contamination in STEM at electron energies of 30 keV and below**
- 17:00 – 17:30      Rasmus R. Schröder, *University Heidelberg, DE*  
**Backscattering EELS at ultra-low landing energies**
- 17:30.–.17:50      *Finger food* (N27, Foyer)
- 18:00 – 19:00      *Piano Concert: Valerij Petasch* (O25, H 4/5)
- 19:30 – 23:00      *Dinner La Fontana, Ratskeller Ulm*

## Wednesday, April 6<sup>th</sup>, Morning sessions

Chair: F. M. Ross

*Session 7: Low-D Materials Synthesis, Characterization and Calculations- III*

9:00 – 9:30

Yimei Zhu, *Brookhaven NL, Upton, NY, USA*

**Cryogenic Electron Microscopy on Strongly Correlated Quantum Materials**

9:30 – 10:00

Colin Humphreys, *Queen Mary University of London, UK*

**Making optoelectronic devices from large-area transfer-free MOCVD graphene: Hall sensors and OLEDs**

10:00 – 10:30

Philipp Wachsmuth, *JEOL GmbH, Freising, DE*

**Pulsed laser integration and electrostatic systems for dose modulation and temporal resolution TEM**

10:30 – 11:00

*Coffee break*

*(N27, Foyer)*

Chair: D. Gerthsen

*Session 8: New methods*

11:00 – 11:30

Claus Ropers, *MPI Göttingen, DE*

**Developments in ultrafast electron microscopy**

11:30 – 12:00

Christoph T. Koch, *Humboldt-Universität Berlin, DE*

**Reconstructing 2D and 3D atomic structure from various types of TEM data**

12:00 – 12:30

Christopher J. Russo, *MRC, Cambridge, UK*

**Molecular structure determination extrapolated to zero dose with an electron cryomicroscope**

12:30 – 13:00

Tatiana Latychevskaia, *PSI, Villingen, CH*

**Convergent beam electron diffraction (CBED) of two-dimensional (2D) materials**

13:00 – 14:00

*Lunch*

*(N27, Foyer)*

## Wednesday, April 6<sup>th</sup>, Afternoon Sessions

- Chair: T. Pichler*      *Session 9: Microscopy and Spectroscopy on low-D materials I*
- 14:00 – 14:30      Jani Kotakoski, *University of Vienna, AT*  
**In and ex-situ (S)TEM manipulation of 2D materials without air exposure**
- 14:30 – 15:00      Michael Stöger-Pollach, *TU Wien, AT*  
**Low Energy Excitations at Low Beam Energies**
- 15:00 – 15:30      Ivan Lazić, *Thermo Fisher Scientific, Eindhoven, NL*  
**Imaging of 2D materials using electrons from 300 keV down to 30 keV**
- 15:30 – 16:00      *Coffee break* (N27, Foyer)
- Chair: W. Jäger*      *Session 10: Microscopy and Spectroscopy on low-D materials II*
- 16:00 – 16:30      Saleh Gorji, *Ametek GmbH, München, DE*  
**Latest Development in EELS**
- 16:30 – 17:00      Peter A. van Aken, *MPI Festkörperphysik, Stuttgart, DE*  
**Atomic-Scale Investigation of Structure and Electron-Beam-Induced Transformation of Beam-Sensitive Molecules**
- 17:00 – 17:30      Toma Susi, *University of Vienna, AT*  
**abTEM: Transmission Electron Microscopy from First Principles**
- 17:30 – 18:00      Arkady V. Krasheninnikov, *HZDR, Dresden, DE*  
**Identifying defects and new phases in 2D materials: how first-principles calculations help to interpret the results of TEM experiments**
- 18:20 – 22:30      *Conference Dinner at Ulm University* (N27, Foyer)  
around 19:30      *ERHU music performance by Dr. Y. Li* (M28, TTU)  
*followed by two after dinner talks:*  
*Prof. Colin Humphreys (London, UK)*  
***From Einstein to SALVE***  
*Prof. Wolfgang Schleich (Ulm, DE)*  
***Prime numbers, analytical continuation and quantum waves***

## Thursday, April 7<sup>th</sup>

Chair: S. J. Haigh

*Session 11: Low D Materials Properties*

9:00 – 9:30

Wu Zhou\*, *University of Chinese Academy of Sciences, Beijing, CN*

Low voltage STEM-EELS at the single-atom level

9:30 – 10:00

Thomas Pichler, *University of Vienna, AT*

Recent advances of momentum resolved electron energy loss spectroscopy

10:00 – 10:30

Ursel Bangert, *University of Limerick, IR*

Subatomic scale revelation of sites and dynamics of individual atoms, as well as of electric dipole configurations, in materials envisaged for quantum device development

10:30 – 11:00

*Coffee break*

(N27, Foyer)

Chair: E. Spiecker

*Session 12: New Horizons II*

11:00 – 11:30

Camilla Coletti, *IIT, Pisa, IT*

Synthesis, transfer, and properties of scalable 2D materials

11:30 – 12:00

Andrey Turchanin, *Friedrich Schiller University Jena, DE*

Influence of intrinsic and extrinsic defects on the electronic and photonic properties of 2D materials

12:00 – 12:30

Lothar Houben, *Weizmann Institute, Rehovot, IL*

Phase retrieval from ultrafast focal series of low dose counting mode images

12:30 – 13:00

Joachim Mayer, *FZ Jülich, DE*

The role of correlative CT and TEM investigations in the development of battery technologies

13:00 – open

*Closing Remarks, Coffee, and Farewell*