

73. IUVSTA Workshop
on
„Nanostructures on two-dimensional solids”
September 22 – 26 2014,
JUFA Eisenerz Ramsau, Austria
Organized by the IUVSTA Nanometer Structures Division

1. Scientific Report

From September 22 - 26 2014, the 73rd IUVSTA workshop was held in Eisenerz, Province of Styria, Austria, in the vicinity of the “Styrian ore mountain”. 41 specialists from 19 countries (for details see the ppt-presentation) were discussing during four days in the middle of the Alps the formation, characterization, and potential application of nanostructure arrays on two-dimensional materials ranging from graphene, hexagonal boron nitride, and transition metal dichalcogenides, to silicene, germanene, topological insulators, and quasi-crystalline thin films. 20 invited speakers - among them four female scientists - from Europe, China, Israel, Japan, and the US followed the invitation of the program committee and gave an overview on the current experimental and theoretical status of the field. Besides the invited presentations, four contributed talks and 11 posters have been given. The workshop was organized by the “Nanometer Structures Division” (NSD) with support by the Surface Science and the Applied Surface Science Divisions. The organizing committee with Hongjun Gao, Institute of Physics, Chinese Academy of Sciences, Beijing, PR China, Markus Kratzer, University of Leoben, Austria, and Thomas Michely, University of Cologne, Germany, and was chaired by Christian Teichert, University of Leoben, Austria. The program committee comprised - besides the chairs of the Surface Science and the Applied Surface Science Divisions - several national representatives of the NSD.

After the workshop opening by the mayoress of Eisenerz and the Rector of the Montanuniversität Leoben (Austrian School of Mines) that was co-organizing the meeting, Christian Teichert, current chair of the IUVSTA NSD gave an introduction into IUVSTA activities in general. Then, Thomas Michely presented in a plenary talk the current status of nanostructures on and under metal supported graphene. The second day was mainly focusing on the fabrication, characterization and growth simulation of metal nanostructures on 2D solids. On the third day, recently discovered silicene was introduced and analogies to topological insulators, ultrathin quasicrystals, and single layer ionic conductors have been discussed. The last day was dedicated to defect structures in 2D materials and to the growing field of organic nanostructures on graphene and related ultrathin substrates.

Two long evening sessions were devoted to poster presentations which started with an oral announcement by each presenter within a 5 min short talk which

was very much appreciated by all attendees. The jury lead by Patricia Thiel, Iowa State University, US, together with Feng Liu, University of Utah, and Antoine Fleurence, Japan Advanced Institute of Technology, had a hard time to select the two poster prizes. The Prizes of 100 € each have been sponsored by the Austrian Vacuum Society and were awarded during the Conference Dinner (with typical Styrian food) to Dr. Susanne Hahne (University of Osnabrück, Germany) und M. Sc. Okan Deniz (EMPA Dübendorf, Switzerland). Beverages served during the poster sessions were sponsored by SPECS GmbH and Oxford Instruments Omicron Nanoscience.

In a round table discussion, the participants were evaluating the success of the meeting and the future of the field. It was pointed out by several participants that the meeting was very successful in giving a podium to discuss the rising field of nanostructures on 2D materials from several aspects. The remote place allowed very intense discussions among all participants. It has been emphasized that such small meetings are frequently more beneficial than much more expensive large conferences.

Besides intense scientific discussions, the participants enjoyed the local food served in the youth and family guesthouse “Eisenerzer Ramsau” in an altitude of more than 1000 m. During the conference excursion on Wednesday afternoon to the nearby monastery in Admont, its world famous monastery library has been visited by the participants. The social program has been completed by a visit of the Museum in the mining town Eisenerz (English “iron ore”), a hike around a mountain lake, and Alpine folk music during the conference dinner.

The workshop program and the list of attendees are presented in the appendix.



Participants during the excursion to the world famous library of the Monastery Admont.

2. Financial Report

It is certified that the IUVSTA funds of €6000 for the 73rd IUVSTA Workshop on „Nanostructures on two-dimensional solids” were completely used to cover the costs of 300 € each for workshop registration, accommodation, and meals of the 20 invited speakers at the workshop venue “JUFA Eisenerzer Ramsau”, as is specified in the list below. The overall budget was break even.

1. Jürgen Behm, University of Ulm, Germany
2. James Evans, Ames Lab, USA
3. Antoine Fleurence, JAIST, Japan
4. Hongjun Gao, Chinese Academy of Sciences, PR China
5. Thomas Greber, University of Zurich, Switzerland
6. Liv Hornekær, Aarhus University, Denmark
7. Jan Knudsen, Lund University, Sweden
8. Marko Kralj, Institute of Physics, Zagreb, Croatia
9. Arkady Krasheninnikov, University of Helsinki, Finland
10. Markus Kratzer, University of Leoben, Austria
11. Feng Liu, University of Utah, USA
12. Thomas Michely, University of Cologne, Germany
13. Bene Poelsema, University of Twente, NL
14. Deborah Prezzi, University of Modena, Italy
15. Jakob Sagiv, Weizman Institute, Israel
16. Levente Tapasztó, Hungarian Academy of Sciences, Budapest, Hungary
17. Patricia Thiel, Ames Lab + University of Iowa, USA
18. Michael Tringides, University of Iowa, USA
19. Oleg Yazyev, EPFL, Switzerland
20. Pengpeng Zhang, Michigan State University, USA

Total support: 20 x 30 € = 6000 €

Appendix:

Workshop Program

time	Monday Sept. 22nd	Tuesday Sept. 23rd	Wednesday Sept. 24th	Thursday Sept. 25th	Friday Sept. 26th
8.30		Session Chair: T. Michely J. Behm*	Session Chair: P. Thiel F. Liu*	Session Chair: J. Evans D. Prezzi*	8:00 Departure
9.10		J. Evans*	J. Sagiv*	L. Tapasztó*	
9.50		T. Kampen	S. Förster	A.J. Martínez-Galera	
10.20		Coffee	Coffee	Coffee	
11.00		Session Chair: J. Behm J. Knudsen*	Session Chair: J. Sagiv O. Yazyev*	Session Chair: F. Liu A. Krasheninnikov*	
11.40		M. Kralj*	B. Poelsema*	L. Hornekær*	
12.20		M.C. Tringides*	A. Fleurence*	M. Kratzer*	
13.00		Lunch	Lunch	Lunch	
14.30		Workshop picture Session Chair: B. Poelsema H.J. Gao*	14.00 Dept. Exc.	Session Chair: L. Hornekær 14.15 P. Zhang*	
15.10		P. Thiel*	Excursion Monastery Admont	14.45 O. Gröning	
15.50		T. Greber*		15.15 Excursion Museum Eisenerz	
16.30	Registration	Break			
17.00	Registration	Session Chair: T. Greber Poster advertisement	Poster session	Hike around Lake Leopoldstein	
18.30	Dinner	Dinner	Dinner		
19.30	Welcome reception Opening including IUVSTA presentation	Poster session	Poster session	Conference Dinner with Poster Prize presentation	
20.00 21.00	Session Chair: C. Teichert Plenary T. Michely		Round table discussion		

* Invited Speaker

List of Invited Speakers with their Topics and Affiliations

R.J. Behm, University of Ulm, Germany

(Bi-)metallic Nanoparticles on Supported Graphene Layers: Model Systems in Electrochemistry / Electrocatalysis

J. Evans, Ames Lab, USA

Simulation of self-assembly and directed assembly of bimetallic nanoclusters on surfaces

A. Fleurence, JAIST, Japan

Epitaxial silicene on ZrB₂(0001): a graphene-like form of silicon".

H.J. Gao, Chinese Academy of Sciences, PR China

Construction and Manipulation of Individual Functional Molecules: from Reversible Conductance Transition to Reversible Spin Control

T. Greber, University of Zurich, Switzerland

Self-assembly of 2 nm voids in hexagonal boron nitride on Rhodium: Creation and Annihilation

L. Hornekær, Aarhus University, Denmark

The interaction of atoms and molecules with graphene on metal substrates

J. Knudsen, Max IV Lab + Lund University, Sweden

Chemistry above and below graphene: Cluster catalysis and interface reactions

M. Kralj, Institute of Physics, Zagreb Croatia

Exploring the mechanism behind the alkali metal intercalation process in epitaxial graphene

A.V. Krasheninnikov, University of Helsinki, Finland

Defects in 2D materials: atomic structure energetics and diffusion

M. Kratzer, University of Leoben, Austria

Organic self assembled nanostructure growth on graphene substrates

F. Liu, University of Utah, USA

Organic Topological Insulators in 2D Organometallic Lattices

T. Michely, University of Cologne, Germany

Plenary Talk: The graphene Moiré with Ir(111) as a template: cluster arrays, antidot lattices and intercalation patterns

B. Poelsema, University of Twente, NL

The instability of silicene on Ag(111)

D. Prezzi, University of Modena, Italy

Edge and Substrate Effects in Graphene Nanostructures: Insights from Ab-initio Investigations

J. Sagiv, Weizman Institute of Science, Israel

Patterned Single-Layer Ionic Conductor – A Generic Approach

L. Tapasztó, Hungarian Academy of Sciences, Budapest, Hungary

Scanning Probe Microscopy based engineering of graphene

P. Thiel, Ames Lab + University of Iowa, USA

Nucleation of Copper on HOPG Terraces

M. Tringides, University of Iowa, USA

Growth of magnetic metals on graphene: morphology interactions and magnetization

O.V. Yazyev, EPFL, Switzerland

Electronic transport in polycrystalline graphene and other 2D materials

P. Zhang, Michigan State University, USA

Growth of Light Harvesting Organic Molecules on Inorganic Substrates

List of Contributed Talks

S. Förster, Martin-Luther-Universität Halle-Wittenberg, Halle, Germany

A two-dimensional oxide goes aperiodic

O. Gröning, Empa, Dübendorf, Switzerland

Adsorption, activation and coupling of organic molecules on metal supported single layer hexagonal boron-nitride

T. Kampen, SPECS Surface Nano Analysis GmbH, Berlin, Germany

Understanding the origin of band gap formation in graphene on metals: graphene on Cu/Ir(111)

A.J. Martínez-Galera, Universidad Autónoma de Madrid, Spain

Selective Modification of Graphene by Means of Scanning Tunneling Microscopy

Poster Contributions

no	Name	Institute	Title
1	Bampoulis, Pantelis	<i>Physics of Interfaces and Nanomaterials group, MESA+ Institute for Nanotechnology, University of Twente, Enschede, The Netherlands</i>	Germanene termination of Ge₂Pt crystals on Ge(110)
2	Deniz, Okan	<i>Empa, Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Switzerland</i>	Electronic Decoupling of Surface-Supported Molecular Nanostructures by Intercalation of Thin Oxide Films
3	Grynko, Dmytro	<i>Institute of Semiconductor Physics NAS of Ukraine, Kyiv</i>	Nanocrystals self-organizing as an approach for single crystal field-effect resistor preparation
4	Hahne, Susanne	<i>Fachbereich Physik, Universität Osnabrück, Germany</i>	Determination of Surface Diffusion Properties from Signal Fluctuations
5	Hartmann, Markus A.	<i>Institute of Physics, Montanuniversität Leoben, Leoben, Austria</i>	Determination of Mechanical Properties of Carbon Nanostructures using Computational Mechanical Tests

6	Konečný, Martin	<i>Institute of Physical Engineering, Brno University of Technology, Brno, Czech Republic, CEITEC BUT, Brno University of Technology, Czech Republic</i>	Charge transfer between separated graphene sheets studied by Kelvin probe force microscopy in ambient conditions
7	Ralević, Uroš Vasić, Borislav	<i>Institute of Physics, University of Belgrade, Belgrade, Serbia</i>	Investigation of doping and strain in graphene using scanning probe microscopy and Raman imaging
8	Storozhuk, Darina	<i>National Taras Shevchenko University, Physics Department, Kiev, Ukraine</i>	Study of the surface potential fluctuations of Ge-Si heterostructures by Kelvin probe force microscopy
9	Vetushka, Aliaksei	<i>Institute of Physics ASCR, Czech Republic</i>	Fine adjustment of Ag (111) surface work function by the adsorption of oriented carborane dipoles
10	Wilhelm, Richard A.	<i>Helmholtz-Zentrum Dresden-Rossendorf, Institute of Ion Beam Physics and Materials Research, Dresden, Germany</i>	Energy deposition of slow highly charged ions in 1nm thick freestanding carbon nanomembranes and Graphene
11	Wrana, Dominik	<i>Marian Smoluchowski Institute of Physics, Jagiellonian University, Kraków, Poland</i>	Influence of Air Passivation on Para-Hexaphenyl Thin Films Growth on TiO₂(110) Flat Surfaces

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