FCMN 2015:
WELCOME TO DRESDEN

Ehrenfried Zschech
Fraunhofer IKTS-MD Dresden and TU Dresden/DCN
Dresden, April 14, 2015
DRESDEN – A MEETING POINT

Picture: Novaled
Picture: Fraunhofer IPMS
Picture: GLOBALFOUNDRIES
**Silicon Saxony E. V.**

**Microelectronics / ICT in Saxony**
Production Sites of Chip Manufacturers in Dresden and Selected Fraunhofer Institutions

**5 Divisions**
Europe’s most successful network for

- **Micro- & NanoElectronics**
- **Software Applications**
- **Smart Systems**
- **Energy Systems**

**Business Fields of Our Members**

- Aerospace
- Communication
- Biotechnology
- Software
- Automotive
- Renewable Energy
- Hardware
- Electronic
- Environmental Technology
- Medical Technology / Pharma
- Equipment

**Silicon Saxony E. V.**
The High-Tech Network

- Vast experience in high volume production (More Moore and More than Moore, 200mm and 300mm)
- Silicon Saxony as core of the ICT cluster (2,100 enterprises, 51,000 employees)
- Strong research landscape (9 universities with over 100,000 students, relevant for MNE: HZDR, 13 Fraunhofer, 3 Max Planck and 3 Leibniz Association)
- Strong industrial base for equipment makers and materials, strength also in 3D systems integration, smart systems
Dresden: „Capital of Materials Research“

Locational advantage:
- More than 2,000 active scientists in materials research, estimated annual budget of 135 Mio €
- Broad competences in different material classes and application fields

Challenges:
- Securing national and international visibility and competitiveness
- Strengthening collaboration of academia and industry in teaching, research and innovation
- Facing current megatrends in research and technology and interdisciplinary topics ("Industrie 4.0")
- Unique competence in computational materials science/simulation and materials characterization.
HISTORY AND VISION - MATERIALS AND STRUCTURE CHARACTERIZATION IN SAXONY: PROFILE LINE OF THE RESEARCH HUB DRESDEN

- Dresden Fraunhofer Cluster Nanoanalysis & Dresden Center for Nanoanalysis at TU Dresden

Visible optics

- Electron and X-ray optics
- Scanning electron microscopy: Manfred v. Ardenne
- Additional partners: DRESDEN-concept, industry

Focusing lense systems: Ehrenfried Walther v. Tschirnhaus

Hub for Materials Characterization:
- Center of Competence
- European User Center
- Technology transfer to industry

- Scientific schools at TUD: A. Recknagel, G. E. R. Schulze

Time

1700 1900 2010 2020

Microscopy resolution
COMPUTATIONAL MATERIALS ANALYSIS AND MATERIALS CHARACTERIZATION within the **DRESDEN CONCEPT** - DRESDEN ALLIANCE FOR NANOANALYSIS: **DCN @ TU DRESDEN** and **DRESDEN FRAUNHOFER CLUSTER NANOANALYSIS DFCNA**

Dresden Center for Nanoanalysis (DCN)

Dresden Fraunhofer Cluster Nanoanalysis (DFCNA)

Dresden Alliance for Nanoanalysis - Added value through synergies -

- Expertise at different length scales and complexity levels
- Broad disciplinary spectrum
- Excellent high performance computing infrastructure and materials analysis infrastructure
- Bundling of competences in interdisciplinary research networks
Cooperation within the „DRESEN concept“
Excellent basic and applied research
Cooperation with industry in bilateral contracts and networks
INDUSTRY PARTNERS IN THE FIELD OF NANOCHARACTERIZATION

Globally operating companies located in Dresden

- Global Foundries
- Infineon
- FAB
- ZMD

SMEs located in Dresden

- Novaled
- Heliatek
- Plastic Logic

Equipment suppliers located in Dresden

- asmec
- HSEB
- AXO

Other companies

- BOSCH
- Volkswagen
- BMW
- Qualcomm
- Mentor Graphics
- Hysitron
- Zeiss
- FEI
- SBA Materials, Inc.
Total: 132 (April 10, 2015)

Participants per sector

- Industry: 65 participants
- Others: 12 participants
- Research Institute: 34 participants
- University: 21 participants

Participants per country

- Austria
- Belgium
- China
- France
- Germany
- Japan
- Korea
- Netherlands
- Sweden
- Switzerland
- United Kingdom
- USA
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cfaed
TECHNISCHE UNIVERSITÄT DRESDEN
DRESDEN concept
SPECIAL THANKS TO …

Supporting Organizations

National Science Foundation (NSF)
American Vacuum Society (AVS)

Cooperation Partners

Dresden Fraunhofer Cluster Nanoanalysis
Fraunhofer IKTS Dresden
Technische Universität Dresden - Dresden Center for Nanoanalysis (DCN) and Center for Advanced Electronics Dresden (cfaed)
National Institute of Standards and Technology

Innotec21 GmbH
SPECIAL SESSION / SYMPOSIUM „3D INTEGRATION“

FCMN Session Chair
Martin Gall, Fraunhofer IKTS-MD Dresden

Fraunhofer Session Chairs
Jürgen M. Wolf, Fraunhofer IZM-ASSID Dresden
Stefan Schulz, Fraunhofer ENAS Chemnitz
Ehrenfried Zschech, Fraunhofer IKTS-MD Dresden
3RD DRESDEN NANOANALYSIS SYMPOSIUM (DNS)

PROGRAM
Friday, 17-04-15
3rd Dresden Nanoanalysis Symposium
(kindly supported by Dresden Fraunhofer Cluster Nanoanalysis (DIFCNAJ))

09:00 Welcome
   Ehrenfried Zschech
   Fraunhofer IKTS Dresden and Technische Universität Dresden, GERMANY

09:15 Material modeling, numerical simulation and characterization - Basis for modern materials science and engineering
   Krzysztof Kurzydlowski, NCBr Warsaw, POLAND

09:40 Combining X-ray microtomography with the finite elements method to study damage and cracking in structural materials
   Henry Proudhon, Centre des Matériaux MINES ParisTech, FRANCE

10:05 Characterization of Nanowires - Electrical, Optical, Thermal
   Heike Riel
   IBM Research, Rüschlikon, SWITZERLAND

10:30 3D chemical analysis of nanodevices using correlative transmission electron microscopy and atom probe tomography
   Adeline Grenier
   CEA, LETI, MINATEC Campus, Grenoble, FRANCE

10:55 Coffee break and poster session

11:25 Materials for a new window of the ICT age
   Rodrigo Martins
   University Lisbon, PORTUGAL

11:50 Organic electronics - A challenge for nanoanalysis
   Karl Leo
   Technische Universität Dresden, GERMANY

12:15 Characterization of nano-structured polymer systems: From nano-medicine to function electronic materials and smart polymers
   Ulrich S. Schubert
   University Jena, GERMANY

12:40 Lunch break and poster session

13:40 Advancements in Electron Microscopy for the Electronics Market
   Rob Krueger
   FEI, Eindhoven, NETHERLANDS

14:05 Recent Applications of an Environmental, Aberration-corrected TEM for Nanomaterial Studies
   Robert Sinclair
   Stanford University, Palo Alto/CA, USA

14:30 Nano X-ray tomography - Novel concepts and applications for energy storage
   Jürgen Gluch
   Fraunhofer Institute for Ceramic Technologies and Systems Dresden, GERMANY

14:55 Fracture toughness and crack propagation analysis for metal-dielectric stacks
   Michael Hecker
   GLOBALFOUNDRIES, Dresden, GERMANY

15:20 Closing remarks and poster prizes
   Ehrenfried Zschech
   Fraunhofer IKTS Dresden and Technische Universität Dresden, GERMANY

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SPECIAL NOTES

Talks on-line
We will ask each speaker for permission after the event

Poster session and complementary wine and cheese: Tuesday 16:15 – 18:15, Hilton Dresden, Rooms 4-5
Numbers are posted above each poster. Authors are responsible for displaying and removing (at the end of the conference) their posters.

Silence Phones! No WLAN in the conference room!

Emergency Exits

Conference Survey
A survey will be distributed via e-mail after the event. Your feedback is appreciated!
CONFERENCE DINNER

Wednesday 19:00
Pulverm restaurant, located just around the corner from the Hilton Dresden