SET-UP 4 FIFTY
(Saxon Equipment Team – Update for Future Innovation Fab Technology)

JOCHEN KINAUER, CLUSTER MANAGER
Agenda

› Information about the Silicon Saxony Cluster
› Vision / Mission for 450mm in Silicon Saxony
› Last years Activities
› 450mm Competence in Silicon Saxony
› 450mm Projects performed by our cluster members
Semiconductor history of Saxony

Samsung acquires Novaled OLED manufacturing from Dresden
X-Fab invests in 8" Dresden wafer fab
Infineon Dresden starts 12" fab for power chips
GLOBALFOUNDRIES and Infineon invest in Dresden fabs
GLOBALFOUNDRIES opens business
Plastic Logic – Start
NaMLab – Start
AMD Fab 38 ground breaking
First AMD production on 12-inch in FAB 36
Fraunhofer CNT opened
Launch of Siltronic 12-inch wafer production
AMD+DuPont+INFINEON decide on Photomask JV
INFINEON launches 12-inch chip production
AMD - Premier 1 GHz-Prozessor
SIEMENS-MOTOROLA 12-inch JV decision
Decision of AMD Microelectronics Fab
Decision of SIEMENS Microelectronics Fab
Privatization of ZMD
Founding of Arbeitsstelle für Molekularelektronik (AMD/AME)
SILICON SAXONY
Semiconductor Experience in Saxony
SILICON SAXONY e. V.
Member Structure

Services
- Service
- Consulting
- Financeing
- etc.

Research & Development
- Universities
- Institutes
- R&D
- Training Facilities
- etc.

Supplier
- Design
- Photomasks
- Semiconductor Fabs
- PV Fabs
- Test / Packaging
- Applications

Infrastructure
- Facilities
- Software
- Materials
- Equipment
- Process-Service
VISION / MISSION FOR 450MM IN SILICON SAXONY
Our Vision

By 2020, Silicon Saxony will be seen as a trendsetter for innovative semiconductor manufacturing technologies for 450mm and below.
Our Mission

› Share information about 450mm projects
› Support a European 450mm Cluster
› Conduct shared R&D projects for 450mm solutions
› Lobby for semiconductor industry for 450mm (and below) → in Europe, Germany and Saxony
› Support initiatives for projects around 450mm technology
› Provide a platform for companies, and institutes that are committed to our vision
› Ensure real time access to latest/newest standards, to changes in spec requirements and new opportunities in 450mm for DD member companies
› Make SilSax companies, although mainly SME, continuously visible to 4-5 big 450 member companies and build picture of global relevance
LAST YEARS’ ACTIVITIES
February 2014
Kickoff Meeting for SETUP 4 FIFTY Ambassador

- Completed Program description and received agreements from member companies and state of saxony
- Introduction of Dr. Udo Nothelfer at CNSE
- Planning of collaboration projects and workshops between SiSax and CNSE in Technology, Economic Development and Research not only on 450mm (200mm power, 300mm MtM development, 3D and advanced packaging, Energy, Smart cities...)

![Meeting Image]
May 2014
Start of the 'SETUP 4 FIFTY Ambassador Program'

- Established Dr. Udo Nothelfer as ambassador of the SETUP4 FIFTY Program
- Support from State of Saxony with a 6 month Internship at Albany, NY as local support for the 'SETUP 4 FIFTY Ambassador Program'
- Financing completed: 50% by State of Saxony, 50% by SiSax members and FhG
June 2014
Green Manufacturing Workshop at CNSE, G450C

› Cooperation around Green Manufacturing Topics between SiSax & CNSE

› Topics:
  › Improved Energy Mgmt and Facilities
  › Improved recycling of chemicals
  › Nitrogen Purge Solutions
July 2014
Virtual Showroom of SETUP 4 FIFTY

Development of a Virtual Showroom as Website for Trade Shows and WebAccess
COMPETENCE WITHIN SETUP 4 FIFTY PROGRAM
OUR MEMBERS
OUR COMPETENCE

Click on a logo to learn more about the member.
AIS Automation Dresden GmbH

- Manufacturing Automation
  - Manufacturing Execution Systems (MES)
  - Equipment Integration
  - Equipment Performance Optimization
  - Process data collection & analysis

- Equipment Controller
  - Controls and host interfaces
  - Cluster tool controller / Inline controller
  - Host interfaces (SECS/GEM, Interface A, …)

- Facility Monitoring Systems

Competence in advanced technologies for semiconductor fabs:
- Equipment Control - Cluster Tool Controller
- Equipment Integration (SECS/GEM, GEM300, InterfaceA);
- Fab Automation (MES, OEE, EDA FW);
- Process & Facility Control

CONTACT:
AIS Automation Dresden GmbH
Otto-Mohr-Strasse 6
01237 Dresden
www.ais-automation.com
Phone: +49 351 21 66 - 0
Enabling Accurate Device Characterization at the Wafer Level

- We are a worldwide leader in the design, development and manufacture of advanced wafer probing solutions for precision test and measurements of ICs, MEMS, 3D TSV, LED devices and more.

- Our leading-edge stations, probes, probe cards, reliability test systems and thermal systems deliver precision accuracy and superior performance both in the lab and during production manufacturing of high-speed and high-density semiconductor chips.

Competence in advanced technologies for semiconductor fabs:

- Engineering & Reliability Test Systems
- Engineering Probes
- Production Probe Cards
- Production Test Systems

CONTACT:
CASCADE Microtech GmbH
Süss Str. 1
01561 Sacka
www.cascademicrotech.com
Phone: +49 35240 / 73-0
DAS Environmental Expert GmbH

Environmental Expert.

- Start: 1991
- Development and manufacturing of innovative
  - Waste gas treatment technologies
  - Wastewater treatment technologies
  - 24/7 service
- 450 mm projects
  - Waste gas treatment system STYRAX

Competence in advanced technologies for semiconductor fabs:

Our Products for 3D Integration:
- STYRAX (burn/wet)
- EDC (electrostatic)
- AQUABATE (wet)

CONTACT:

DAS Environmental Expert GmbH
Goppelner Str. 44
01219 Dresden, Germany
www.das-europe.com
Phone: +49 351 / 40 49 4-000
Competence in advanced technologies for semiconductor fabs:
- Chemical supply systems
- Gas supply systems
- Special systems
- Recycling systems
- Prototyping and volume manufacturing for OEMs
- Customized design & manufacturing

- Start
  - Foundation: 2004
- Company profile
  - Chemical Supply (Blending Systems, Acids and Caustics, Solvents)
  - Gas Supply (Bulk and special Gases, Compressed Dry Air)
  - Other Systems (Water, Vacuum)
  - Tool Hookup
- Capacity and business
  - Currently stuff: 400

CONTACT:
Fäth GmbH
Schwabacher Str. 10
D-01665 Klipphausen
www.faeth.com
Phone: +49 35204 / 3930-50
Fraunhofer Group for Microelectronics

- Capacity and business
  - Foundation: 1996
  - 11 institutes + 5 guests from other groups
  - Total currently stuff: > 3000

- Profile
  - Smart Systems for
    - AAL, Health and Well-Being
    - Energy Efficient Systems
    - Mobility & Urbanization
    - Smart Living
  - Technologies from CMOS to Smart Systems
  - Information & Communication Technologies
  - Safety & Security

CONTACT:
Fraunhofer-Verbund Mikroelektronik
Anna-Louisa-Karsch-Str. 2
10178 Berlin
www.mikroelektronik.fraunhofer.de
Phone: +49 30 / 688 3759-6101

Wafer-based Technologies:
- Small Volume Manufacturing of ICs and Smart Systems
- Technologies up to 28nm/300mm
- Special Processes for 450mm

Competences:
- Semiconductor based Technologies
- Design for Smart Systems
- Smart Systems Integration
- Power Electronics
- RF & Communication Technologies
- Sensor & Sensor Systems
- Quality & Reliability
HAP GmbH Dresden

- Automation specialist and service provider
- 70 employees
- 20 Mio US$ turnover
- Roots within Carl Zeiss
- Established 1991

Carrier Handling:
- Fully automated
- Fixed, mobile and fully free travelling robot solutions
- 150mm / 200mm / 300mm
- Flexible adaption to various production, inspection and metrology systems (ASML, AMAT, LAM, KLA, Mattson, Novellus, …)
- More than 160 installations

Subcontractor of OEMs in SEMI and PCB Industry:
- Complex mask and frame handling tasks
- Handling of EUV masks in < ISO 1 environment
- Handling in controlled environments
- Expertise in manufacturing of Laser Direct Imaging systems for PCB industry
- Successful serial production of > 600 systems

Wafer Handling:
- 150mm – 450mm
- Various fab-proven solutions

CONTACT:
HAP GmbH Dresden
Gostritzer Straße 63
01217 Dresden
Germany
www.hap.de
Phone: +49 351 871 8060
**HSEB GmbH Dresden**

All side wafer inspection and metrology is increasing yields, preventing disasters.

**Process and Quality Control:**
- Process & Excursion control
- Industry benchmark COO
- 100% Wafer and all side inspection

**Automatic and manual review**
- Wafer front and back side
- Cutting edge manual and automated microscopes
- Multiple features for flexible use
- Up to 450mm

**Automatic inspection / AOI**
- Wafer frontside w/ high sensitivity
- Optical Wafer backside
- Edge inspection and metrology
- Unique inspection technology
- Highest Throughput in Industry
- Up to 450mm

**Competence in advanced technologies for semiconductor fabs:**
- Automatic, optical inspection and metrology
- Automatic and manual review
- Innovator and Partner for 14nm FeoL and FDSOI to WLP and fine Pitch CuPillar.

**CONTACT:**
HSEB Dresden GmbH
Manfred-von-Ardenne-Ring 4
01099 Dresden
www.hseb-dresden.de
Phone: +49 351 / 20758-0

**Siemens Saxony e. V. / Jochen Kinauer**
Competence in advanced technologies for semiconductor fabs:
- Automation Capability Management
- Equipment Integration
- Cell Controller solution
- Advanced Process Control solution
- DiDaCT – SECS/GEM test tool

### Start
- Founded: 2003

### Company profile
- Systems integration
- Software design and architecture
- Equipment integration and tool testing
- Advanced Process Control
- Tool and fab automation
- Connectivity

### Capacity and business
- Current staff: 35
- Start
  - Founded in 2009

- Company profile
  - Unique process optimization and control solutions for leading edge semiconductor lithography
  - OVALiS Suite: the most advanced software for on-product overlay optimization, throughput optimization, overlay process control, focus monitoring and much more

CONTACT:
Qoniac GmbH
Fetscherstraße 72
01307 Dresden
www.qoniac.com
Phone: +49 351 / 418 933 40

Competence in advanced technologies for semiconductor fabs:
- Advanced diagnostics and visualization capabilities for process optimization
- Unique R2R simulator for finding best alignment, metrology and APC settings
- Best overlay process control solution by applying R2R field-fine corrections
Focus: For over 15 years, Ortner has been participating in complex Factory Automation in clean production environments. With the aim of making our customers’ production lines more efficient and competitive.

Served Industries: Semiconductor (Frontend & Backend), Photovoltaic, Pharmaceutical

Locations: Dresden (Germany); Salt Lake City (USA)

3 Business Units:

- Fab Automation Solutions
- AMHS, AGV
- Storage Systems
- Loading Tools
- RFID Systems
- FOUP Purge Systems
TU Dresden, Institut für Angewandte Informatik

- Currently staff: 32
- Software for analysis, regulation and stabilization of industrial processes
- Tools:
  - www.autospy.de
    Real time recording for electrical signals, PLC’s, OPC, LonWorks
  - ADM
    Model identification, controller design

CONTACT:
TU Dresden, Institut für Angewandte Informatik
Helmholtzstr. 10
01062 Dresden
www.iai.inf.tu-dresden.de/tis
Phone: +49 351 / 463-38289

Competence in advanced technologies for semiconductor fabs:
- Software for Process Identification
  APC, Predictive Maintenance, Equipment Controllers
- Software for Fab Logistics Optimization, Troubleshooting in Factory IT
Vistec Electron Beam GmbH

- Start
  - Foundation: 1996 (background since 1970’s: ZEISS Jena, Jenoptik, Leica Microsystems)

- Company profile
  - Flexible solutions for advanced electron-beam lithography
  - Vistec SB3050 / SB4050 Series:
    - 50keV high-resolution Variable Shaped Beam electron optics with 1nm writing/address grid
    - fully automated substrate handling with mini environment for versatile applications
    - SB4050 Series with air bearing stage for future technology nodes, 450mm wafer capability optional

Contact:
Vistec Electron Beam GmbH
Ilmstrasse 4
07743 Jena
www.vistec-semi.com
Phone: +49 3641 / 7998 0

E-beam Lithography
- direct write in mix & match with optical litho for fast prototyping & low volume manufacturing (CMOS ; III/V)
- high overlay accuracy
- 450mm air bearing platform
Brief Company Overview

- Founded in 1983, 120 employees
- Focus on High Tech Industries
- Delivering best quality

“Software implementation made easy: configuration instead of coding“

Our Solutions and Services…

- Shop Floor Automation
- Manufacturing Execution System (MES)
- Equipment Engineering System (EES)
- Advanced Process Control (APC)
- Real Time Dispatching (RTD)

…for your Benefit

- Increase efficiency and productivity
- Reduce costs
- Gain transparency and visibility
- Improve quality
- Achieve entire production control

Leverage from our extensive know-how in Wafering, Frontend, Backend and other areas
450MM PROJECTS PERFORMED BY OUR CLUSTER MEMBERS
HAP 450mm EU Projects

Gripper for 450mm wafers

- wafer handling by using a 6 axis robot: TX60SCR
- no slip of wafer (acceleration > 1.5g on 2 combined horizontal axis, vacuum 600mbar)
- no slip during vertical orientation and move (acceleration 0.2g, vacuum 600mbar)

Funding by Free State of Saxony and EU
AIS 450mm EU Projects

EEMI450 Project
- WP 2.1 Specification of Common Cluster Platform with Focus on Software Interface Standard
- WP 2.3 Optimization of Interface A

NGC 450
- WP 2.1 Control Software Platform

EEM450PR
- WP 4.1 Idle (‘Green’) Modes
- WP 4.3 SW req. for Manufacturing Automation

E450EDL Control SW Platform
- WP 6.2.1 Equipment Automation & Integration

Project Partners: IMEC, Intel, Nanoplas, Edwards, ASYS, RECIF, IBS, IISB, HQ-D, AIS
CLUSTER MANAGER SISAX 450MM CLUSTER:

JOCHEN KINAUER
AIS AUTOMATION DRESDEN GMBH
+49 351 2166 1253
JOCHEN.KINAUER@AIS-AUTOMATION.COM