ikz LEIBNIZ-INSTITUT FÜR KRISTALLZÜCHTUNG

3rd IKZ WINTER SCHOOL

LAYER TRANSFER TECHNOLOGIES

from artifical crystals to novel applications

BERLIN & ONLINE (HYBRID FORMAT)

DECEMBER 08 - 10, 2021

On the topic

Layer Transfer Technologies

Layer transfer introduces a paradigm change in the way crystalline heterostructures could be synthesized. In contrast to established growth methods of epitaxial heterostructures which must oblige to matching conditions at the interface with respect to surface energies, lattice parameter and crystal symmetry, layer transfer allows in principle for the combination of any crystalline materials.

The potential to create novel artificial crystalline heterostructures has been demonstrated with 2-dimensional van der Waals (2D-vdW) materials such as graphene. New functional interfaces can be realized by combinations of different 2D-vdW-materials and by re-assembling layers in different ways, for example by introducing a twist angle between the layers. To make novel materials and heterostructures available to applications, demands scale-up and integration to existing fabrication lines. We will discuss the latest developments of integration of 2D-materials and functional oxides into Si-technology. Further, a wide range of state-of-the-art layer transfer, micro transfer printing and wafer bonding technologies will be covered.

Organization

The Leibniz-Institut für Kristallzüchtung (IKZ)

is a research institution that is unique in Europe. Our mission is to explore the scientific and technological fundamentals of crystal growth, from basic research to pre-industrial development.

Furthermore, we provide scientific services for research institutions and industry. This includes, in particular, the growth of specific crystals for research purposes, the characterization of crystalline materials or industry-oriented technology development.

Organizational details:
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Winter School details:
www.ikz-berlin.de/en/3rd-ikz-winter-school

Zoom session:
Registered participants will receive the access data by email.

Registration:
Please send an email to winter.school@ikz-berlin.de with details of your institution, position and your preferred format (online / on-site).

Registration deadline:
November 22, 2021

Participation fees:

Students and PhDs:	50,- Euro
Academic researchers:	250,- Euro
Industrial employees:	500,- Euro

Venue:
Leibniz-Institut für Kristallzüchtung (IKZ)
Max-Born-Str. 2
12489 Berlin, Germany

Participants are asked to organize their accommodation by themselves.

Schedule

LAYER TRANSFER TECHNOLOGIES - FROM ARTIFICIAL CRYSTALS TO NOVEL APPLICATIONS

Wednesday, December 8	***Layer Transfer of 2D-materials***
1:00pm – 1:20pm	*Welcome by Thomas Schröder, Director IKZ*
1:25pm – 2:10pm*	***Electronic structure of 2D-vdWaals materials and heterostructures*** *Jens Martin, IKZ*
2:10pm – 2:55pm*	***Exfoliation and layer transfer of 2D materials*** *Emil List-Kratochvil (HZB, HU)*
2:55pm – 3:40pm*	***Organic/2D hetero structures - basic properties and devices*** *Emil List-Kratochvil (HZB, HU)*
Thursday, December 9	***Integration of novel materials to Si-technology***
1:00pm – 1:45pm*	***2D/3D Heterostructure Devices*** *Max Lemme (RWTH, AMO GmbH)*
1:45pm – 2:30pm*	***Large Area Integration of 2D Materials - the European Experimental 2D Pilot Line*** *Max Lemme (RWTH, AMO GmbH)*
2:30pm – 3:15pm*	***Challenges of integrating functional oxides in Si-technology*** *Jean Fompeyrine (Lumiphase AG)*
3:15pm – 4:00pm*	***$BaTiO_3$ for integrated photonics: epitaxial oxides on the market*** *Jean Fompeyrine (Lumiphase AG)*
Friday, December 10	***Micro transfer printing & Device-to-Device***
1:00pm – 1:45pm*	***Basics of adhesion & transfer printing*** *Andreas Mai (TH Wildau, IHP)*
1:45pm – 2:30pm*	***Applications for Micro-transfer printing*** *Andreas Mai (TH Wildau, IHP)*
2:30pm – 3:15pm*	***Permanent wafer-to-wafer-bonding*** *Kai Zoschke (IZM)*
3:15pm – 3:45pm*	***Temporary wafer bonding and handling of thin wafers*** *Kai Zoschke (IZM)*

* incl. 15min discussion

Lecturers

Dr. Jens Martin
Leibniz-Institut für Kristallzüchtung, Berlin

Group manager „2D goes 3D" by Layer Transfer at IKZ. With a background in fundamental research of graphene and other 2D-materials, he currently focuses on process development of layer transfer for various materials including 2D-van der Waals materials and oxide perovskite layers.

Prof. Dr. Emil J. W. List-Kratochvil
Humboldt-Universität zu Berlin
Helmholtz Zentrum Berlin

Professor for Hybrid Devices at the Humboldt-Universität zu Berlin (HU) and head of a Joint Lab operated by HU and HZB. He works on printing processes for hybrid perovskite devices and 2D semiconductor/organic hybrid material systems and devices.

Prof. Dr. Max Lemme
RWTH Aachen University
AMO GmbH, Aachen

Holds the Chair of Electronic Devices at RWTH and is CEO of AMO GmbH. He is working on electronic, optoelectronic and nanoelectromechanical devices and sensors made from graphene and related 2-D materials and their integration into silicon technology platforms.

Dr. Jean Fompeyrine
Lumiphase AG,
Kilchberg, Switzerland

Head of Materials and Production at Lumiphase AG. Lumiphase is a swiss startup that develops a disruptive integrated photonic technology using thin crystalline $BaTiO_3$ thin films. This technology will enable low-cost, high performance electro-optic modulation.

Prof. Dr. Andreas Mai
TH Wildau, Leibniz Institute for High Performance Microelectronics IHP

Professor „Micro- and Nanoelectronics" at TH Wildau and head of the Technology Department at IHP. His focus is on developing silicon-based devices for analog applications, silicon photonics, and processing and integration of graphene in silicon technology compatible platforms.

Dipl.-Ing. (FH) Kai Zoschke
Fraunhofer Institute for Reliability and Microintegration IZM

Process Development Engineer and Group Manager „Wafer Level Packaging and 3D Process Integration" at IZM. His current projects are focused on vertical integration of systems based on logic- and memory- or sensor chips as well as transceivers and antennas.