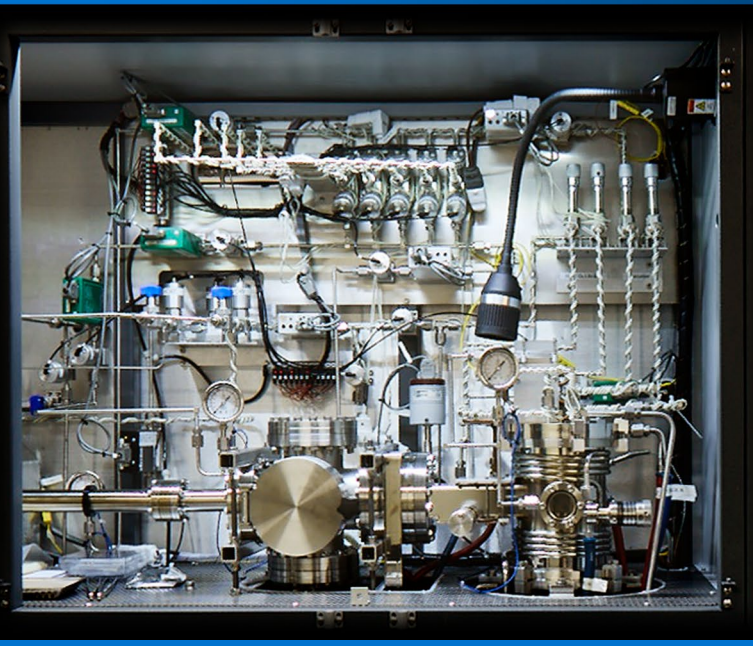
ikz LEIBNIZ-INSTITUT FÜR KRISTALLZÜCHTUNG

12th IKZ Summer School



FUNDAMENTALS OF VAPOR-PHASE THIN FILM DEPOSITION

September 07+08, 2020

Berlin / Leibniz-Institut für Kristallzüchtung (IKZ)

LECTURER

Contact (scientific):
E: yhx@seas.ucla.edu
P: (310) 825-2971

Prof. Dr. Ya-Hong Xie

obtained the B.Sc. degree in physics from Purdue University, West Lafayette, IN, in 1981, and the M.Sc. and Ph.D. degrees in electrical engineering from the University of California at Los Angeles (UCLA), Los Angeles, in 1983 and 1986, respectively.

He was a member of the technical staff in the Physical Sciences and Engineering Research Division, Bell Laboratories from 1986 till 1999. In 1999, he joined the faculty of UCLA as a Professor in the Department of Materials Science and Engineering where he currently serves as vice chair.

His current research interests include plasmon resonance and neural network enabled bio-sensing, and lattice mismatched heterostructures including group III nitrides.

www.seas.ucla.edu/smrl/
www.samueli.ucla.edu/people/ya-hong-xie/

ORGANIZATION

Contact (organization):
Stefanie Grüber
P: +49 30 6392 3263
E: summer.school@ikz-berlin.de

Venue:
Leibniz-Institut für Kristallzüchtung (IKZ)
Max-Born-Str. 2
12489 Berlin, Germany
www.ikz-berlin.de/en

Summer School details:
www.ikz-berlin.de/en/summerschool

Registration:
For registration send an email to summer.school@ikz-berlin.de with details of your institution and position.

As space is limited the number of attendees is limited to 60.

Participation fees:
The participation in the IKZ-Summer-School is free.

Accomodation:
All guests are asked to take care of their overnight stays themselves. There are several hotels available nearby. A timely reservation is strongly recommended.

The **LEIBNIZ-INSTITUT FÜR KRISTALLZÜCHTUNG** (IKZ) is a unique research institution 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.

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Lecturer: Prof. Dr. Ya-Hong Xie

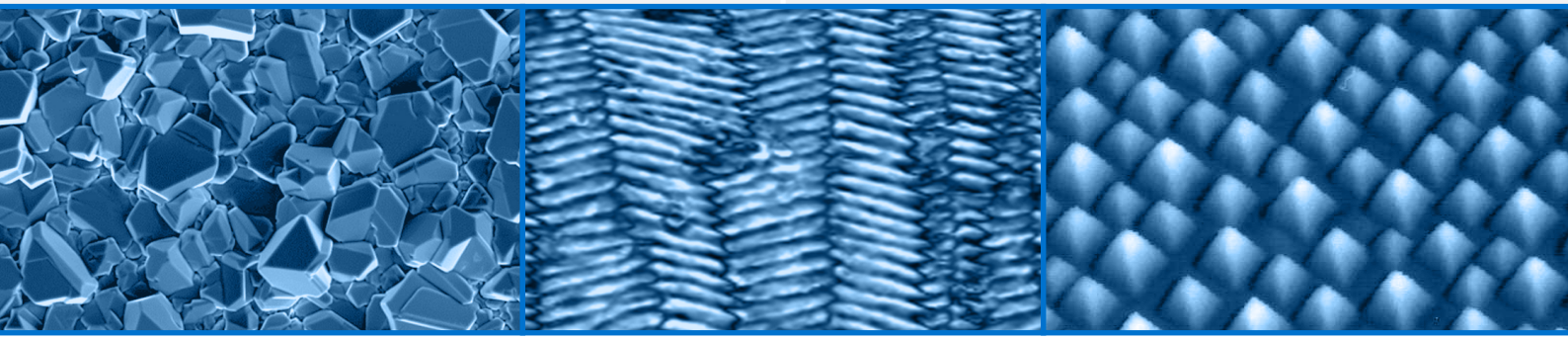
Monday, September 07, 2020

SESSION 1: 10a.m.-12p.m.

- Elementary thermodynamics on the physical phases of matter: entropy vs enthalpy
- Introduction to gas kinetics
- Transport properties (mass, energy and momentum) in gas phase
- Introduction to vacuum technology
- Deposition from solid source: physical vapor deposition (PVD)
- On solid-vapor (liquid-vapor) equilibrium and deviation from equilibrium: evaporation and deposition being “the two sides of the same coin”

SESSION 2: 1p.m.-3p.m.

- The growths of compounds and alloys and the concept of single-phase field
- Uniformity considerations;
- The types of evaporation sources and rate control fundamentals
- Dynamics of adatoms
- The concept of surface energy
- Nucleation in 2D and 3D
- Morphological evolution of thin films



Tuesday, September 08, 2020

SESSION 3: 10a.m.-12p.m.

- The growths of single crystals: epitaxy
- Crystalline defects
- Chemical vapor deposition (CVD): typical components of a growth system
- Pros and cons of CVD vs PVD
- Precursor kinetics
- Thermodynamic considerations of chemical reactions
- Reaction rates
- Different regimes of CVD processes

SESSION 4: 1p.m.-3p.m.

Selected topics on the application of thin films:

- Protection film: intrinsic & extrinsic stress, film delamination
- Semiconductor technology
  - Doping profile control considerations, e.g. microwave diodes
  - Heterostructure, e.g. HBTs: commensurate vs incommensurate
  - Strained structure fabrication, e.g. Si IC, GaN: misfit strain, dislocation kinetics, etc.
  - Pertinence to 5G communication