



## Tutorials at the ICANS23:

Four tutorials of 90 minutes each will be given by very experienced and well known experts. The tutorials are aimed both at graduate students and professional scientists interested in the fundamentals of research and in applications in the various topics. The tutorial fee will cover all 4 sessions which will be given in sequence, 2 in the morning and 2 in the afternoon. The fee will also cover coffee breaks and lunch and will include an invitation to the welcome drinks at the end of the day.

### Date:

Sunday, August 23, 2009.

### Location:

Mitland Hotel Utrecht, Ariënslaan 1, 3573 PT UTRECHT, the Netherlands

### Tutorial registration:

Registration will be possible at this website ([www.icans23.org](http://www.icans23.org)) from mid April.

### Tutorial schedule:

9:00 h – 10:30 h:

Tutorial 1: **Basic physics of disordered semiconductors**  
**Prof. Dr. Martin Stutzmann** (Walter Schottky Institute, Munich)

This tutorial will provide an introduction into the basic structural and electronic properties of disordered semiconductors. Starting from basic thermodynamic considerations, the differences between disordered glasses and over-constrained amorphous semiconductors will be discussed. Based on structural data such as the radial distribution function, we will then explore the expected electronic structure of disordered semiconductors and discuss important intrinsic aspects of amorphous semiconductors such as the origin and the role of band tails, localized versus delocalized electronic states, or coordination defects. Next, the technologically important issues of doping, auto-compensation, and metastable defects will be covered. Finally, we will use these concepts to address the even more complicated case of nano- or microcrystalline semiconductors, which constitute a non-linear combination of more or less well-known crystalline parts with less-known disordered grain boundary material.

10:30 h – 11:00 h:

Coffee break

11:00 h – 12:30 h:

Tutorial 2: **Reactor design for thin-film Si deposition**  
**Dr. Alan Howling** (EPFL, Lausanne)

Uniformity of Si thin-film thickness and properties is crucial for large area, industrial applications. In this tutorial, some basic principles and plasma diagnostics of PECVD showerhead reactors will be considered regarding electromagnetics, gas flow and depletion, as well as the transient response at plasma ignition. Perturbations to the inherent uniformity of a showerhead reactor will be briefly discussed.

12:30 h – 13:30 h:

Lunch break

13:30 h – 15:00 h:

Tutorial 3: **Characterization techniques**  
**Dr. Reinhard Carius** (IEF5-Photovoltaics, FZ Jülich)

This tutorial covers a wide range of characterization techniques

commonly used for the characterization of thin-film semiconductors. The first part on electronic transport measurements deals with quasi-equilibrium transport such as dark conductivity, Hall effect and Thermopower (Seebeck coefficient). The second part addresses non-equilibrium transport, i.e. photoconductivity, CPM and time-of-flight. In the third optical absorption (T/R and PDS) will be briefly described. The last part will be on characterisation of microstructure by Raman, TEM and XRD.

15:00 h – 15:30 h: Coffee break

15:30 h – 17:00 h: Tutorial 4: **Current and future applications**  
**Dr. Bob Street** (Palo Alto Research Center)

The tutorial will describe the main applications of amorphous and nanocrystalline semiconductors, including thin film transistor arrays, photovoltaics and flexible electronics, and will also discuss some of possible future opportunities. The emphasis will be on amorphous silicon and organic semiconductors, and how the material properties make them suitable for the various applications.

17:00 h – 19:00 h: Welcome drinks

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