

Title of the talk: "Optical, structural, and electronic properties of thin poly-crystalline silicon layers"

Abstract

As a special case of the metal-induced crystallization (MIC) the aluminum-induced layer exchange (ALILE) process shares the advantages of crystallization temperatures down to about 120°C combined with large crystallites in the range of several tens of nm up to a few hundred micrometers with layer thicknesses from 10 nm to 600 nm. By changing the initial stacking order from substrate/Al/Al-oxide/amorphous Si (normal ALILE) to substrate/amorphous Si/Si-oxide/Al (Reverse ALILE) the resulting system has a polycrystalline layer with an Al-backcontact underneath which can be used in technical applications like diodes, transistors, solar cells, etc.

In order to use these layers in applications the characteristics have to be understood. The optical and structural properties are investigated using transmission and reflection measurements, which give insight in the crystallization process depending on parameters like temperature and layer thicknesses. Raman measurements are used to determine the crystal quality of the layers. The very high carrier concentrations in the layers investigated with Hall-effect measurements can be reduced significantly by deuterium-passivation. This is a necessary step to achieve a low level of carriers where it is possible to create Schottky contacts on the poly-crystalline layer.

In this talk I will give a brief introduction to the ALILE process and the underlying theory. Subsequently, I will show some results of the optical and structural measurements and what they tell us about the crystallization in the initial amorphous Si layer. Finally, the results of the electrical characterization will be shown along with a short description of the deuterium passivation process.