NCMN

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Novel InN-based materials for sustainable energy

A sustainable energy future is one of the major global challenges today pointing to the acute need for improved materials. InN(Indium Nitride)-based materials provide unique opportunities for device applications targeting both i) increasing the fraction of energy supply coming from sustainable energy sources and ii) improving the efficiency of energy conversions and end uses. The revision of the band gap energy of wurtzite InN from 1.9 eV to 0.6 eV has opened the way for the application of InGaN and InAlN alloy thin films in a new class of highly efficient solar cells and visible light emitting diodes for solid state lighting. Consequently, considerable research interest has been focused on InN, related alloys and low-dimensional structures. However, many of the fundamental properties of InN-based materials remain still controversial and the related metrology is challenging.

In this talk, the electronic properties and the doping mechanisms in InN-based materials will be discussed in relation to their application in photovoltaics and optoelectronics. Details on the microstructure and impurity incorporation and dynamics in InN films with different surface orientations will be given. Special attention will be paid to the phenomenon of electron accumulation at the surfaces of InN-based materials, observed or expected to occur only in very few semiconductors. The challenges in understanding and assessment of doping mechanisms in InN-based materials will be described. Finally, the precise measurement of the free-charge carrier properties (effective mass, concentration and mobility) of InN films by the unique Optical Hall effect will be presented.

Host:
Dr. Mathias Schubert
Department of
Electrical Engineering

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237 Scott Engineering Center, 1:30 p.m.—UNL City Campus
— Refreshments provided —