



**Dienstag, 23. Oktober 2007**

**17.15 Uhr**

**Hörsaal V 57.01**

**Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen**

Gastgeber: Prof. Dr. Harald Giessen, Universität Stuttgart, Telefon: 0711-685-65111

## **New Materials in Microelectronic Applications: Dreams versus Reality**

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### **Abstract**

Over the next quarter century considerable challenges exist to squeeze the required performance out of conventional silicon devices and metallization schemes at nanometric dimensions and huge efforts are made to enhance device and interconnect performance in order to meet the ever increasing demands of communication, computing and memories.

On the other hand, new materials like carbon nanotubes, graphene and nanowires are emerging from the research area.

First investigations of these new materials revealed properties which are very attractive for solving the technological hurdles that the semiconductor industry is facing. The high current carrying capacity, high thermal conductivity and low charge carrier scattering combined with the huge resilience of carbon-based nanostructures promise to solve challenges in the interconnect area, whereas the low effective electron and hole mass, the attractive band gap and absence of dangling bonds in carbon nanotubes address the needs of a fast, energy-efficient and high-k dielectric compatible device of the future.

The possible applicability of graphene as device is mainly limited by the very small energy gap in contrast to the reasonable gap in carbon nanotubes.

The performance of Si nanowire transistors is lacking behind that of nanotubes but Si nanowires are much more easier to integrate and promising examples are at hand. However, the step from a hand-crafted, proof-of-concept device example to a highly integrated, reliable technology is huge and hardly achievable within a few years.

Therefore, this talk presents the status and trends of these new materials and highlights the recent progresses, which have been achieved in terms of properties, performance and applications.

(Kolloquiums-Tee gibt es um 16.45 Uhr im Seminarraum des 4. Physikalischen Instituts, NWZ II, 4. Stock, Raum 4.319. Studenten sind herzlich eingeladen.)