InfraRed Optical Nanostructures

FWF SFB IR-ON Symposium:

InfraRed Optical Nanostructures

8. + 9. April 2010, TU Wien, Gusshausstr. 27-29, EI 8, 1040 Wien

The need for environmental sensing, fast trace gas detection, control of hazardous material, pollution control is of critical importance to the modern industrial society. Our quality of life, safety and environmental legacy are all directly affected by the chemical environment we live in and leave behind. Recent geopolitical events have created a demand for new security systems. The optical absorption lines of many important chemical compounds (drugs, explosives and hazardous chemicals) fall into the infrared spectral region (2-20µm). To solve this real world, macro-scale problem, namely the shortage of photonic devices for the infrared wavelength range, we utilize nanostructures, to make significant advances in the understanding and development of future devices.

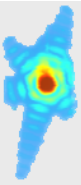
The realization of semiconductor nanostructures in particular of quantum dots formed by self-organization offers fascinating perspectives both for fundamental physics and for the development of new electronic and photonic devices. Since semiconductor quantum dots resemble "artificial" atoms, their apparent quantum nature can be combined with advantages of the "classical" semiconductor world. In this way these ensembles of semiconductor atoms can be contacted with wires, integrated in circuits and built with high integration. The confinement to the nanometer scale (<100nm /<0.0001 mm/) leads to quantized energy levels with energy differences corresponding to the infrared spectral region. Nanostructuring of semiconductors adds new functionality -- infrared optical activity. The goal of the joint effort IR-ON is to investigate, understand, and make use of this infrared optical activity which is entirely determined by quantum size effects. Since the infrared properties are determined by quantum effects and not by material parameters alone we try to give optical activity to a variety of materials including Silicon by using Silicon/Germanium nanostructures - eventually giving future high integrated circuits optical sensing capabilities.

contact: barbara.weber@tuwien.ac.at

LASER FEST
CELEBRATING 50 YEARS OF LASER INNOVATION

InfraRed Optical Nanostructures

IROn



IR-ON Symposium

Thursday, April 8th 2010

17:30	**Jérôme Faist** *(Institute for Quantum Electronics, ETH Zürich, Switzerland)* **Quantum cascade lasers: ultrabroadband operation and applications in the mid-infrared and terahertz**

Friday, April 9th 2010

09:05	Welcome
09:10	**Daniël Vanmaekelbergh** *(Debye Institute for NanoMaterials Science, University of Utrecht, NL)* **Colloidal quantum dots and quantum dot solids: the beauty and the science**
10:00	**Georg Kresse** *(Computational Materials Physics, Universität Wien)* **Ab-initio description of nanostructures: Challenges and Successes**
10:50	Coffee break (30min)
11:20	**Armando Rastelli** *(Institute for Integrative Nanosciences, IFW Dresden, Germany)* **Stress as Fabrication and Post-Fabrication Tuning Tool for Quantum Dots**
12:10	Lunch break (1h 50 min)
14:00	**Gunther Springholz** *(Institute of Semiconductor & Solid State Physics, Johannes Kepler Universität Linz)* **Infrared-Active Semiconductor Quantum dots based on a Novel Synthesis Method**
14:50	**Karl Unterrainer** *(Photonics Institute, Technische Universität Wien)* **Phase-resolved THz spectroscopy of nanostructures and quantum cascade lasers**
15:40	Coffee break & Discussion (open end)

FWF Der Wissenschaftsfonds.