sity functional theory (DFT) and time-dependent DFT, respectively. In the excited state, the modified occupation numbers of the frontier orbitals define an anisotropic change of the electronic charge density. Therefore, the deformation in the relaxed excited state consists of a symmetry conserving part and of a symmetry-breaking distortion from T_d towards D_{2d}. The projection of these different parts of the deformation pattern onto the vibrational modes in the electronic ground state generates the vibronic progressions observed in photoluminescence (PL). The lineshapes obtained from this projection scheme are compared with available experimental data, resulting in similar PL energies and linewidths.

HL 31.11 Wed 17:30 H17

Room-temperature storage of excitons in elongated semiconductor nanocrystals — •Robert Kraus[1], Pavlos Lagoudakis[1], Andrey Rogach[1], John Lupton[2], Jochen Feldmann[1], Dmitriy Talapin[3], and Horst Weller[3] — [1]Lehrstuhl für Photonik und Optoelektronik, Ludwig-Maximilians-Universität München — [2]Department of Physics, University of Utah, Salt Lake City, USA — [3]Institut für Physikalische Chemie, Universität Hamburg

The excited state of colloidal nanostructures consisting of a spherical CdSe core overgrown with a rod-like CdS shell can be perturbed effectively by electric fields.[1-3] Field-induced fluorescence quenching coincides with a suppression of radiative rate without increasing ionization. After turning off the electric field, a significant fraction of quenched - and therefore stored - excitons recombines radiatively, even for a duration of the electric field pulse of up to 100 μs. Application of an electric field not only promotes the separation of electron and hole wave function but also influences the depopulation dynamics of localised states on the surface of the nanocrystal. This leads to a significant change in the exponent of the characteristic power law decay of the delayed luminescence. Furthermore, exciton storage selects the most polarisable particles, therefore a significant quantum confined Stark shift of ˜15 meV along with a correlated broadening of the spectrum is visible in the time-resolved emission of the ensemble at room temperature.

[1] J. Müller et al., Phys. Rev. Lett. 93, 167402 (2004)
[2] R. Kraus et al., Phys. Rev. Lett. in press (2006)
[3] J. Müller et al., NanoLett. 5, 2044 (2005)

HL 31.12 Wed 17:45 H17

Single InGaAs Quantum Dots Embedded in Electrically Active Photonic Crystal Nanocavities — •Felix Hofbauer, Michael Kaniber, Max Bichler, Gerhard Böhm, Gerhard Abstreiter, and Jonathan Finley — Walter Schottky Institut, Am Coulombwall 3, TU München, 85748 Garching, Germany

We present investigations of the coupling of single InGaAs quantum dots (QDs) to both extended and strongly localised optical modes in electrical contacted 2D photonic crystal (PC) nanostructures. The samples investigated consist of an 180nm thick, free-standing GaAs membrane into which a PC is formed by etching a triangular lattice of air holes. Low mode-volume ($V < (\lambda/n)^3$) and high-Q (~ 2000) cavities are introduced by single missing hole defects. Embedding the QDs into the intrinsic region of a p-i-n diode enables us to apply static electric fields to QDs in the cavity and control the energy detuning between the dot and cavity using the quantum confined Stark effect.

The active PC nanocavities were studied using spatially resolved luminescence and photocurrent absorption spectroscopy. Quenching of the PL is observed for fields > 50 kV/cm due to carrier tunneling escape from the dots that occurs over timescales faster than the radiative lifetime. By measuring the PL quenching as a function of position on the PC and nanocavity we electrically probe the local density of photonic states via a shift of the threshold voltage. Also investigations of the exciton lifetime and PL intensity of single QDs as a function of spectral detuning from the cavity mode are made.

Supported financially via Sonderforschungsbereich-631

HL 32: C/diamond

Time: Wednesday 16:30–18:00 Location: H14

HL 32.1 Wed 16:30 H14

Diameter and density controlled synthesis of high quality carbon nanotubes via predefined gas phase prepared catalyst particles — •Franziska Schäffel, Christian Kramberger, Mark Rümmeli, Daniel Grimm, Thomas Gemming, Thomas Pichler, Bernd Büchner, Bernd Rellinghaus, and Ludwig Schultz — IFW Dresden, P.O. Box 270116, D-01171 Dresden, Germany

Due to their excellent mechanical and electronic properties carbon nanotubes (CNTs) are promising candidates for the integration into nano-electro-mechanical systems such as nanorelays and actuators or transistors. Effective control of the CNT growth and positioning is however mandatory for the realization of any of these applications. We report on an innovative technique to grow CNT by chemical vapour deposition (CVD) using cyclohexane. Here, the catalyst particles are synthesized separately by inert-gas condensation using DC magnetron sputtering at pressures in the mbar range. This allows for the production of pure catalyst particles with a narrow particle size distribution. The particles act as individual nucleation sites for the growth of CNTs. The size of the particles and their spatial distribution template the diameter and the density of the resulting CNT, respectively. This use of separately generated particles provides significant advantages such as the possibility to engineer the size, morphology, spatial distribution, and mutual separation of the CNTs *prior* to the CVD process. The opportunity to characterize the catalyst particles prior to the CVD reaction together with post-CVD studies of the resulting CNTs provides superior insight into the CNT growth process.

HL 32.2 Wed 16:45 H14

Pressure-induced phenomena in single-walled carbon nanotubes — •K. Thirunavukkuarasu[1], C.A. Kuntscher[1], Á. Pekker[2], K. Kamarás[2], F. Hennrich[3], M. Kappes[3,4], and Y. Iwasa[5] — [1]Experimentalphysik II, Universität Augsburg, D-86159 Augsburg, Germany — [2]Research Institute for Solid State Physics and Optics, Hungarian Academy of Sciences, P.O.Box 49, Budapest, Hungary H 1525 — [3]Institut für Nanotechnologie, Forschungzentrum Karlsruhe, D-76021 Karlsruhe, Germany — [4]Physikalische Chemie, Universität Karlsruhe, D-76128 Karlsruhe, Germany — [5]Institute for Materials Research, Tohoku University, Sendai 980-8577 (Japan)

The study of single-walled carbon nanotubes (SWNTs) under high pressure has attracted much interest recently as the application of pressure induces structural deformations of the SWNTs and also tunes the intertube interactions by changing the distances between the tubes. Both should significantly affect the properties of the SWNTs.

We studied the optical response of thin films of both unoriented and oriented SWNTs over a broad frequency range (IR-VIS) and for pressures up to 8 GPa. The effect of pressure on oriented nanotubes caused major changes in the optical properties only for the polarization along the nanotube axis. We will discuss in detail the effect of pressure on the electronic properties like interband transitions for the different SWNT films.

Supported by the DFG, Emmy Noether-program. Provision of beamtime at the ANKA Angströmquelle Karlsruhe is acknowledged.

HL 32.3 Wed 17:00 H14

Suppressed formation of electron-hole droplets in diamond under strain — •Nobuko Naka, Junko Omachi, and Makoto Kuwata-Gonokami — Department of Applied Physics, The University of Tokyo, Tokyo 113-8656, Japan

Recent advances in growing high-purity single crystal diamonds have led to new opportunities to investigate the optical properties of high-density electron-hole systems created by photo-excitation in diamond. At low temperature, droplets (EHD) of electron-hole pairs in the liquid phase coexist with excitons or plasmas in the gas phase [1,2]. Shimano et al. [2] studied the formation dynamics of the EHD by applying time-resolved luminescence spectroscopy to a type IIa diamond crystal grown by high-temperature, high-pressure synthesis. The luminescence signal originating from EHD has a rise time of 60 ps, while plasma luminescence emerges within the experimental resolution. From temperature dependence measurements, they reported a critical temperature of 165 K for the EHD formation. Although this temperature is much higher than the ones reported for silicon and germanium, EHD in diamond are stabilized due to a delicate balance