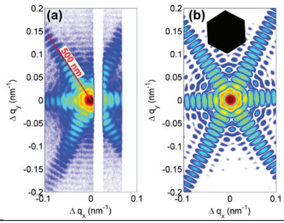

Fig.3 RSM of single rod and FFT of hexagon shape object

We report on X-ray characterization of single GaAs NRs grown by selective-area MOVPE on GaAs[111]B. We show that one is able to separate individual NR´s within a regular NR array using a micro-beam setup. Using Fourier transform of experimental data we are able to reconstruct the hexagonal shape of the nanorod shown in Fig. 3.

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Keywords: nanocrystals; XRD

FA5-MS06-P05

High Efficiency Core-shell Nanowires and Their Characterisation by X-ray Diffraction. Özgül Kurtuluş[a], Ullrich Pietsch[b]. [a]*Division of Physics, Doğuş University.* [b]*University of Siegen, Siegen, Germany.*
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The controlled organisation of nano-materials in arrays of confinements with regular spacings is a key issue in fabricating functional nanodevices. Structural characterisation of these materials is essential for understanding their physical properties and evaluating their future applications in nano-electronics. The performance of nanodevices can be improved by effective surface passivation. The best passivation to date is the creation of core-shell heterostructures. In order to protect the electronic performance, both core and shell materials have to have a lattice mismatch as low as possible. For II-VI semiconductor nanomaterial systems, CdSe/CdS, CdSe/ZnS, and CdSe/ZnSe core-shell structures are under investigation up to now, but there is no report on the preparation and applications of uniform core-shell nanowires prepared by the succesive ion layer adsorption and reaction (SILAR) technique which improves the nanowire photostability. Cadmium chalcogen nanowires and corresponding core-shell nanowires could serve as a solution for high efficiency and low cost solar cells. The aim of this work is to produce uniform core-shell CdSe/CdS, CdSe/ZnS, CdSe/CdS-ZnS nanowires with SILAR technique and to determine the crystalline structure, the aspect ratios and the strain acting parallel and perpendicular with respect to nanowire axis by using transmission electron microscope (TEM) and synchrotron x-ray diffraction (XRD). In this study, the diameter of the nanowires is determined by TEM and XRD around 10 to 20nm. The lengths are determined by TEM in the order of μms, while the coherence length along the growing direction is obtained around a few tens of nms. These two parameters basically affect the optical and electrical properties of nanowires, which will influence ttheir efficiency The nanowire crystalline structure is determined by XRD and high resolution TEM. The nanowires are found to be randomly oriented and each of them exhibiting the admixture of wurtzite and zinc blende structure separated by stacking faults which is common in CdSe nanomaterials. For the first time, the ratio between wurtzite (W) and zinc-blende (ZB) structure in nanowires is quantified as less than 10% through XRD. This crystalline admixture has significant effects on the optical properties of nanowires and explains the observation of optical heterogeneity in individual cadmium chalcogen nanowires.

Keywords: nanostructures; chalcogenides; powder x-ray diffraction

FA5-MS06-P06

Preparation of the Noble Metals Nanoalloys Using Single-Source Precursors. Yuri Shubin[a], Sergey Korenev[a], Andrey Zadesenez[a], Pavel Plusnin[a], Evgeny Filatov[a]. [a]*Nikolaev Institute of Inorganic Chemistry of SB RAS, Novosibirsk, Russia.*
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In the most of chemical methods of nanoalloys preparation are used mixtures of individual precursors. Reduction of different metallic atom occurs no simultaneously. It results in two-phase mixture of different kinds of metals or core-shell particles. Using single-source complex precursors containing both alloy components ensures simultaneous reduction and preparing particles with homogeneous distribution of atoms.
The thermolysis of double complex salts at relatively low temperature (200-400ºC) gives nanoalloy powders. Depending on the phase diagram of the respective bimetallic system and temperature conditions its can be single phase or multiphase products. For example, the reduction of $[Pd(NH_3)_4][AuCl_4]_2$, $[Pd(NH_3)_4][IrCl_6]$, $[Rh(NH_3)_5Cl](ReO_4)_2$ under H_2 atmosphere produces nanoalloys $Au_{0.67}Pd_{0.33}$, $Pd_{0.50}Ir_{0.50}$ and $Rh_{0.33}Re_{0.67}$ respectively. Disordered $Pt_{0.50}Ni_{0.50}$ was obtained from $[Pt(NH_3)_4][Ni(Ox)_2(H_2O)_2]•2H_2O$ in He atmosphere while in H_2 atmosphere – a two-phase mixture of disordered $Pt_{0.50}Ni_{0.50}$ and ordered PtNi. In all cases crystallite sizes of bimetallic particles varied within 5–25 nm. The main parameters influenced on the phase composition and crystal structure of powder are thermal and chemical properties of precursor and the conditions of the experiment.
Structural and interphase transformations of bimetallic particles were investigated. The new results concerning equilibrium solid state solubility in the Rh-Re and Ir-Re systems are represented and discussed.
Acknowledgements. This work was financially supported by the interdisciplinary project of fundamental research SB RAS N112, and by RFBR grants 08-03-00603-a and NSh-636.2008.3.

Keywords: nanocrystallites; noble metals; binary alloys