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TRANSMISSION ELECTRON MICROSCOPY AND PHOTOLUMINESCENCE CHARACTERIZATION OF InGaAs STRAINED QUANTUM WIRES ON GaAs VICINAL (110) SUBSTRATES, BYOUNG. R. SHIM, s. TORII, T. OTA, K. KOBAYASHI, H. NAKASHIMA (Institute of Scientific and Industrial Rcsearch Osaka Univ., Osaka 567. Japan), and S. Y. LEE (Dept. of physics. Kyungpook National Uni., Taegu, Korea)

We have demonstrated the formation of InAs[1] and InGaAs[2] quantum wires(QWRs) at the giant step edges on vicinal (110) GaAs substrates. In this paper, we report on transmission electron microscopy (TEM) study of $In_xGa_{1-x}As$ wire structures. Varying InAs composition x in the range between 1.0 and 0.1. The purpose of this study is to determine InAs composition range of dislocation free $In_xGa_{1-x}As$ wire structures. We also report on the results of photoluminescence (PL) characterization of these dislocation free QWRs. The preparation procedure of InGaAs quantum wires is the following : Samples were grown on vicinal (110) GaAs substrates misoriented 3" toward (111). A thick GaAs buffer layer (200 nm) was grown on the vicinal substrates. Then, a five period AlGaAs/GaAs superlattice layer was grown in order to obtain coherently aligned of giant steps with nearly equal spacing. Next, $In_xGa_{1-x}As$ layer was grown on AlGaAs lower barrier. systematically varying the InAs composition x from 1.0 to 0.1. A nominal growth thickness of InGaAs layer was 3nm. The samples for the plan-view TEM observation were prepared by chemical etching. For the PL and the cross sectional TEM observation, an AlGaAs upper barrier and GaAs cap layer were grown onto the surface after InGaAs layer growth. The sample for the cross sectional TEM observation was prepared by Ar ion thinning. The substrate temperature was kept 500℃ for all samples. Plan-view TEM observation revealed that the dislocations were introduced to release strain due to lattice mismatch in the samples with InAs composition x larger than 0.3. The strain relief of these samples is anisotropic. i.e., for $x \geq 0.8$ samples, residual strain is larger in [110] direction than in [001] direction and for $x \leq 0.6$ samples. residual strain is larder in [001] direction than in [110] direction. Dislocation density decreases with decreasing InAs composition x. No dislocation was found in the samples with x=0.1 and 0.2. The cross sectional TEM image of sample with x=0.1 clearly indicated the formation of wire structures at the giant step edges. The PL spectra showed peaks which were reasonably assigned as emissions from QWRs. As the peak position shifted toward lower energy side with increasing InGaAs thickness. Polarization of the emission confirmed this assignment. On the basis of above results, we conclude that dislocation free InGaAs quantum wire structures are realized by our natural formation method in the InAs composition x=O.1 and 0.2 for nominal growth thickness of 3 nm. It is expected to grow dislocation free QWRs with higher InAs composition if the growth thickness is reduced.

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SURFACE STRUCTURE OF ALE-GROWN POLYCRYSTALLINE CALCIUM SULFIDE THIN FILMS STUDIED BY AFM, **SRIJATA DEY, S. J. YUN and M.-C. PAEK** (Semiconductor Technology Division, Electronics and Telecommunications Research Institute, Taejon, 305-350, Korea).

Calcium sulfide is a promising host material for the application in blue-emitting electroluminescent(EL) phosphors. The reliability of EL devices can be influenced by the surface roughness which is controlled by the growth conditions. AFM imaging are performed to study the influence of ALE-growth parameters on surface roughness and to know about the details of morphological features (e.g. size and height of crystallites). Polycrystalline thin films of CaS, and Pb^{2+}doped CaS were grown on Al_2O_3 deposited on Si(100)-wafer in a travelling wave reactor ALE chamber. AFM images of thin films grown at different temperatures were compared with respective SEM images of same lateral resolution and a satisfactory agreement was observed. In SEM, the necessary Au-coating induced certain roughness and high energy electron beam may deform the surface, unlike the non-destructive method of AFM. On the ALE-grown CaS films, cubic crystallites with average size: ~2200-3500Å and r.m.s. roughmess: ~170-200Å were noted. For Pb doped films, the roughness was lower than the undoped CaS films and tetrahedral crystallites were also observed in addition to cubic crystallites.

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ORGANIC ELECTROLUMINESCENT DEVICE UTILIZING POLYMER HOLE TRANSPORT MATERIALS FOR PERFORMANCES IMPROVEMENT, JANG-HO YOON, MIN-KYU SONG, SE YOUNG OH, JEONG WOO CHOI and HEE-WOO RHEE (Dept. of Chem. Eng., Sogang Univ., Seoul 121-742, Korea)

Polymeric hole transport materials (HTM) were synthesized for the enhancement of luminance efficiency and thermal stability of multilayer EL devices. The structure of HTM was modified by using poly[N-(*p*-diphenylamine)phenyl methacryl amide] (PDPMA) and derivatives (PMDPMA, PMoDPMA). In this study we investigated photoluminescence, electroluminescence, current voltage and luminance characteristics of the devices and compared its properties with the organic EL devices composed of low molecular weight HTM. Also, impedance spectroscopy was used to study the thickness- and moisture-effect on the performance of devices.

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CHARACTERISTICS OF ORGANIC LIGHT-EMITTING DIODES WITH HOLE TRANSPORT LAYER PREPARED VIA VAPOR DEPOSITION POLYMERIZATION, J. G. LEE(Electronic Materials Lab., IAE / Dept. of System Eng., Ajou Univ., Suwon 442-800, Korea), D. K. CHOI and Y. KIM (Electronic Materials Lab., IAE, Yongin P.O. Box 25, Kyonggi-Do 449-020, Korea), and S. N. KWON, S. C. KIM, and K. JEONG(Dept. of Physics, and Atomic-scale Surface Science Research Center, Yonsei Univ., Seoul 120-749, Korea)

Organic light-emitting diodes were fabricated using the thin polymeric film dispersing a hole transport material (HTM) into an aromatic polyimide (PI) and the molecular film of a chelate complex. To obtain high stability, we have attempted to prepare the hole transport layer (HTL) through vapor deposition polymerization which is a fully dry process. X-ray photoemission spectroscopy and atomic force microscopy were performed for the structural investigation of the HTL. The charge injection of the device was initialized at the applied voltage of 5.7 V. The brightness at 9 V and the maximum luminous efficiency were *ca.* 10^4 cd/m^2 and 12 lm/W, respectively.

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