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ROOM TEMPERATURE STRONG POLARIZED EMISSION IN SELF-ASSEMBLED GAAS NANOWIRES

One-dimensional quantum semiconductor arrays are intriguing systems for exploring fundamental physical properties and potential electronic and optoelectronic applications [1]. In particular, such nanowire arrays exhibit anisotropic effects in their electronic transport and light emission properties [2]. Here, we report the dependence of polarization in the photoluminescence (PL) emission due to this anisotropy in GaAs nanowires grown by self-assembly between AlGaAs barriers, synthesized by Molecular Beam Epitaxy (MBE) on a high-index GaAs substrate. Strong emission was obtained from PL and micro-PL measurements, even at room temperature. Furthermore, anisotropic behavior was observed in the emission intensity of the quantum wires, achieved from linearly polarized measurements, indicating good 1D confinement. Polarization degrees as high as 0.4 (40%) were obtained, confirming significant polarization dependence. Applications related to this high degree of polarization at room temperature, such as the fabrication of Vertical-Cavity Surface-Emitting Lasers (VCSELs) for use in various laser products including fiber optic communications are highlighted. [1] Jia, C., Lin, Z., Huang, Y. & Duan, X. Nanowire Electronics: From Nanoscale to Macroscale. *Chem Rev* 119, 9074–9135 (2019). [2] Cruz-Hernández, E. et al. Photoluminescence study of self-assembled GaAs quantum wires on (631)A-oriented GaAs substrates. *Journal of Vacuum Science & Technology B: Microelectronics and Nanometer Structures* 30, 02B111-5 (2012).

Keywords

Polarized, Nanowires, MBE, GaAs, Photoluminescence

Reference

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Author will attend

I confirm

Author: SÁNCHEZ MARTÍNEZ, Elihu Hazel (Coordinación para la Innovación y Aplicación de la Ciencia y Tecnología, Universidad Autónoma de San Luis Potosí)

Co-authors: LÓPEZ LÓPEZ, Máximo (Departamento de Física, Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional); Dr MÉNDEZ-CAMACHO, Reyna (Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional); YEE-RENDON, C.M. (Facultad de Ciencias Físico-Matemáticas. Universidad Autónoma de Sinaloa. Calle Universitarios Ote., Cd Universitaria, Universitaria, 80010 Culiacán Rosales, Sinaloa, México.); CERDA MÉNDEZ, Edgar A. (Instituto de Investigación en Comunicación Óptica, Universidad Autónoma de San Luis Potosí); CRUZ HERNÁNDEZ, Esteban (Coordinación para la Innovación y Aplicación de la Ciencia y Tecnología, Universidad Autónoma de San Luis Potosí)

Presenter: SÁNCHEZ MARTÍNEZ, Elihu Hazel (Coordinación para la Innovación y Aplicación de la Ciencia y Tecnología, Universidad Autónoma de San Luis Potosí)

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