490. Title:Composition and phase tuned ingaas alloy nanowires
Authors:Jung, Chan Su (1); Kim, Han Sung (1); Jung, Gyeong Bok (1); Gong, Kang Jun (1); Cho, Yong Jae (1); Jang, So Young (1); Kim, Chang Hyun (1); Lee, Chi-Woo (1); Park, Jeunghee (1)
Source title:Journal of Physical Chemistry C
Volume:115
Issue:16
Issue date:April 28, 2011
Publication year:2011
Pages:7843-7850
Language:English
Document type:Journal article (JA)
Abstract:InxGa1-xAs (0 &le x &le 1) alloy nanowires (average diameter = 50 nm) were synthesized at 800 °C with complete composition tuning by the thermal evaporation of GaAs/InAs powders. X-ray diffraction and Raman spectroscopy confirmed the complete composition tuning over the whole range. They exhibit exclusively a superlattice structure composed of zinc blende phase twinned octahedral slice segments having alternating orientations along the axial [111] direction and wurtzite phase twin planes. When the mole fraction (x) approaches 0.5, the period of the twinned superlattice structures becomes shorter, showing a controlled wurtzite-zinc blende polytypism. At x = 0.5, the wurtzite phase is dominant with the shortest superlattice periodicity (∼2 nm). The smaller diameter consistently induces shorter periodic superlattice structures. This unique polytypism shows that the incorporation of In (or Ga) and the smaller diameter promotes the crystallization of the nanowires in the wurtzite phase. These InxGa1-xAs nanowires produce an efficient THz emission, showing minimized carrier mobility at x = 0.5, where the superlattice stacking faults are maximized.