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Effects of interfacial bonds and strain on the formation of InAs/GaSb Self Organized Nanostructures[1]

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Interfacial effects play an important role on the formation of self-organized nanostructures based on the morphological instability of strained semiconductor multilayers. For many III-V systems with a misfit of less than 1%, instability occurs at some critical layer thickness, which is typically large (>150 Å). However, for the non-common anion strained system, InAs/GaSb, the instability is observed at a thickness of a few monolayers. In this presentation, the results of a structural analysis by x-ray diffraction of an InAs/GaSb planar and nanowire superlattice grown by molecular beam epitaxy (MBE) with different interfacial bonds will be presented. Cross sectional scanning tunneling microscopy (XSTM) and atomic force microscopy (AFM) were also used to probe the physical structure of the superlattices. The effects of the strain and interfacial bond on the formation of the nanostructures will be discussed as well as how they may be manipulated to control the formation of these nanostructures in this system and other III-V systems. Also presented will be the results from a preliminary analysis of the effects of the nanostructure on the optical properties of the system.

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