NANOSCALE SELF ASSEMBLY AND PHYSICS OF SEMICONDUCTORS COUPLED QUANTUM DOTS.

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Semiconductor self assembled quantum dots (QDs) exhibit physical characteristics which are dominated by the three dimensional quantum confinement of carriers and excitons. This confinement brings into play important many body effects and confers to the QDs “atom like properties”. We will discuss first the self-ordering and positioning of semiconductor QDs using lattice strain engineering in the InAs/GaAs QDs system. This technique makes possible the fabrication of “quantum dot molecules”. We then report on the optical properties of strain and electronically coupled InAs/GaAs quantum dots as a function of their position and examine the importance of tunneling on the properties of the exciton.