SEMINAR

SiGe nanostructures: Growth, properties and potential applications

As a prototypical material system for heteroepitaxial quantum dot growth we here consider SiGe strained islands on Si(001) substrate surfaces. We find that surface interdiffusion between deposited Ge and Si atoms from the substrate is the driving force for alloying [1], motion [2] and shape/size oscillation effects [3]. In depth information about these phenomena is obtained by selective etching procedures [1,4] that allow us to derive the full 3D alloy profile of a single island [5] or nanoring [6], to reveal tree-ring like footprints left behind by dislocated islands [3] and to “move” islands to predefined locations on in-situ patterned substrates [7]. These fundamental investigations are important to understand basic aspects of strained island growth as well as to apply and integrate SiGe islands into existing CMOS technologies [8].

[1] U. Denker at al., Phys. Rev. Lett. 90, 196102 (2003);[2] U. Denker et al., Phys. Rev. Lett. 94, 216103 (2005); [3] T. Merdzhanova et al., Phys. Rev. Lett. 96, 226103 (2006); [4] O. G. Schmidt et al., Appl. Phys. Lett. 81, 2614 (2002); [5] A. Rastelli et al., Nano Letters 8, 1404 (2008); [6] M. Stoffel et al., Appl. Phys. Lett. (in press); [7] G. Katsaros et al., Phys. Rev. Lett. 101, 096103 (2008); [8] O. G. Schmidt and K. Eberl, IEEE Transactions on Electron Devices 48, 1175 (2001)

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This talk is sponsored by EU 7FW project Unam-Regpot (Grant No:203953)

Date: June 12, 2009 (Friday)
Time: 11:00
Place: Physics Department Seminar Room