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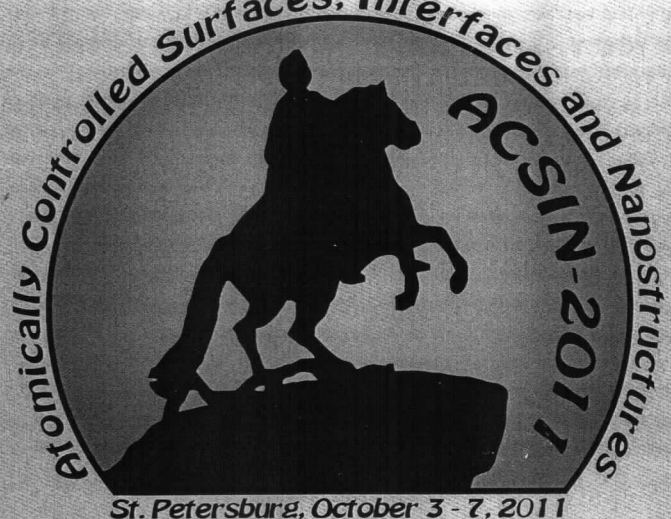

BOOK OF ABSTRACTS

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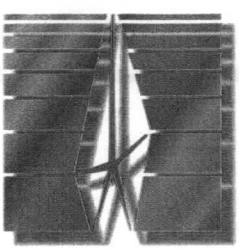

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Hydrogen behaviour in amorphous Si/Ge nano-structures after annealing

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The H behaviour in a-Si, a-Ge, a-SiGe is still debated, also thanks to their employment in photovoltaic solar cells whose performance depends on dangling bonds passivation by H. a-SiGe can be obtained by depositing alternating nano-layers of a-Si and a-Ge and intermixing the 2 atoms by annealing. Here results on H behaviour upon annealing of nano-structures made of 50 couples of very thin (3 nm each) alternating layers of a-Si and a-Ge are given. The superlattice nano-structures were deposited by sputtering. Hydrogen was added at flow rates of 0.4 to 6 ml/min. ERDA of a-Si and a-Ge single layers showed that for flows ?1.5ml/min the incorporated H saturates at 16 at% and 7 at% in Si and Ge, respectively. IR optical absorbance showed that H is mostly incorporated as Si and Ge monohydrides. Annealing was done at 673 K for times between 1 and 10 h. The H behaviour in nano-structures as a function of annealing and H content was followed by IR optical absorbance, AFM and ERDA. With increasing annealing temperature/time the surface morphology degrades with formation of bumps and craters whose size and density increase with increasing H content. Upon annealing the signals of Ge-H and Si-H complexes disappear in the IR spectra indicating that H is released to the lattice. This supports the conclusion that it is the released H that produces bumps and craters when the bumps blow up because of the high internal pressure of H. ERDA of a-Si and a-Ge single layers, showing a faster H release in a-Ge than in a-Si, suggests that in the superlattice nano-structures H is first released from the a-Ge layers upon annealing. This agrees with literature reporting on the lower binding energy of Ge-H with respect to Si-H. It also shows that H is unstable against annealing.