Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

**Optimization of metamorphic buffers for molecular epitaxial growth of high quality AlInSb/InSb quantum structures** YINQIU SHI, WIN, Department of Physics and Astronomy, DENISE GOSSELINK, WIN, Department of Electrical and Computer Engineering, KAVEH GHARAVI, IQC, Department of Physics and Astronomy, JONATHAN BAUGH, IQC, Department of Chemistry, ZBIGNIEW WASILEWSKI, WIN, Department of Electrical and Computer Engineering, University of Waterloo, Canada — Strong spin-orbit interaction in InSb quantum wells and wires makes them attractive candidates for the realization of Majorana bound states. Molecular beam epitaxy (MBE) is the best tool to obtain these structures but lack of suitable substrates demands development of low dislocation density, smooth metamorphic buffer layers, lattice matched to the InAlSb/InSb material system. Here we present a comparative study of MBE growth of such buffers on GaAs substrates oriented in [001] crystallographic direction and [001] offcut 2° towards [100]. 1$\mu$m-thick AlSb nucleation buffers were grown on both substrates with optimized growth conditions. The high density of surface terraces on the offcut substrates effectively suppressed the formation of undesirable hillocks, typical of growth on [100] substrates. Further lattice constant grading and dislocation filtering was achieved through repetitions of $Al_{0.24}In_{0.76}Sb$ interlayers in the $Al_{0.12}In_{0.88}Sb$ matrix. Surface morphology evolved quite differently through these stages of metamorphic buffer preparation on both types of substrates, resulting in up to 50nm-high hillocks for the on-orientation substrates and hillock-free morphology for 2° off substrates. Mechanism of hillock suppression is discussed.

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Date submitted: 06 Nov 2015 Electronic form version 1.4