Abstract Submitted
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Novel Chalcogenide Buffer Layer for Oxide Heteroepitaxy on Si(001)[1] D. SCHMIDT[2], T. OHTA[3], Q. YU, F. S. OHUCHI, M. A. OLMSTEAD, U. of Washington, Seattle — We have developed a novel chalcogenide buffer layer for heteroepitaxial growth of oxides on silicon and applied it to growth of anatase TiO_2. Anatase, nearly lattice-matched to Si(001), is of interest for both spintronic and high-K dielectric applications: it can be made ferromagnetic at room temperature by doping with Co, and has a very large dielectric constant. Through use of a sub-nanometer buffer layer, Ga_2Se_3 grown on As terminated Si(100), we have been able to grow anatase nanocrystals on Si(001) without any detectable substrate oxidation or silicide formation. The As termination prevents silicon-selenide formation, and the gallium selenide prevents substrate oxidation. The cubic structure of Ga_2Se_3 offers a stable face for TiO_2(001) growth. In addition, the Ga_2Se_3 layer, with a lattice constant between Si and TiO_2, has a structure with inherent vacancies that can absorb strain, acting as a strain relief layer for the TiO_2 on Si.

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