Abstract Submitted
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The growth of c-axis oriented $BaTiO_3$ films on Si and Ge for a non-volatile field-effect transistor[1] J.H. NGAI, D. KUMAH, M. MARSHALL, Y. SEGAL, C.H. AHN, F.J. WALKER, Dept. of Applied Physics, Yale University — The reorientable polarization of a ferroelectric material can be utilized in a variety of applications, including the development of novel memory devices. Of particular interest is the use of a ferroelectric's spontaneous polarization to maintain "on" and "off" conductivity states in a field effect transistor. $BaTiO_3$ has been proposed as a Pb-free ferroelectric for such an application. Direct coupling of the ferroelectric polarization with the channel of a field effect transistor requires c-axis oriented $BaTiO_3$ films to be grown on Si or Ge. However, due to the small thermal expansion coefficients of Si and Ge, $BaTiO_3$ films tend to be a-axis oriented, having the polarization lying in the plane of the film. In order to achieve c-axis oriented $BaTiO_3$ films, we have developed a graded buffer layer that imparts in-plane compressive strain to overcome the incompatibility in thermal expansion. Ferroelectric, c-axis oriented, $BaTiO_3$ films with thicknesses exceeding 120 nm have been achieved. We will discuss the growth and characterization of these films in the development of a non-volatile, ferroelectric transistor.

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