

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

MIS and MFIS Devices: DyScO₃ as a gate-oxide and buffer-layer

R. MELGAREJO, N.K. KARAN, J. SAAVEDRA-ARIAS, D.K. PRADHAN, R. THOMAS, R.S. KATIYAR, Department of Physics and Institute for Functional Nanomaterials, University of Puerto Rico, P O Box 23343, PR 00931 — Metal-Ferroelectric-Insulator-Semiconductor (MFIS) structure is of importance in non-volatile memories, as insulating buffer layer that prevents interdiffusion between the ferroelectric (FE) and the Si substrate. However, insulating layer has some disadvantages *viz.* generation of depolarization field in FE film and increase of operation voltage. To overcome this, it is important to find a FE with low ϵ_r (compared to normal FE) and an insulating buffer layer with high ϵ_r (compared to $\epsilon_r = 3.9$ of SiO₂). High- k materials *viz.* LaAlO₃, SiN, HfO₂, HfAlO etc. have been studied as buffer layers in the MFIS structures and as gate-oxide in metal-insulator-silicon (MIS). Recently, a novel gate dielectric material, DyScO₃ was considered and studies indicate that crystallization temperature significantly increased and the film on Si remained amorphous even at 1000 °C annealing. Considering the requirements on crystallization temperature, ϵ_r , electrical stability for high- k buffer layers, DyScO₃ seems to be very promising for future MFIS device applications. Therefore, the evaluations of MOCVD grown DyScO₃ as gate-oxide for MIS and the buffer layers for Bi_{3.25}La_{0.75}Ti₃O₁₂ based MFIS structures are presented.

Reji Thomas
Department of Physics and Institute for Functional Nanomaterials,
University of Puerto Rico, P O Box 23343, PR 00931

Date submitted: 30 Nov 2007

Electronic form version 1.4