

The background of the slide features a large, light gray watermark of the Indian Institute of Technology Bombay logo. The logo is circular, with a gear-like outer border. Inside the circle, there is a lotus flower in the center. The text "INDIAN INSTITUTE OF TECHNOLOGY BOMBAY" is written in a circular path around the lotus. At the bottom of the logo, there is a banner with the Sanskrit motto "ज्ञानम् परमम् ध्येयम्".

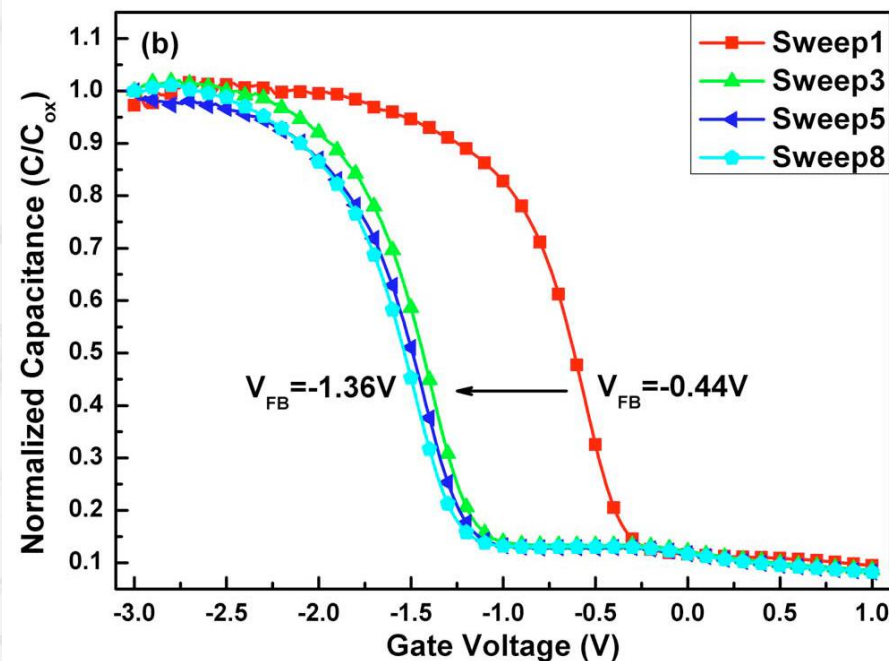
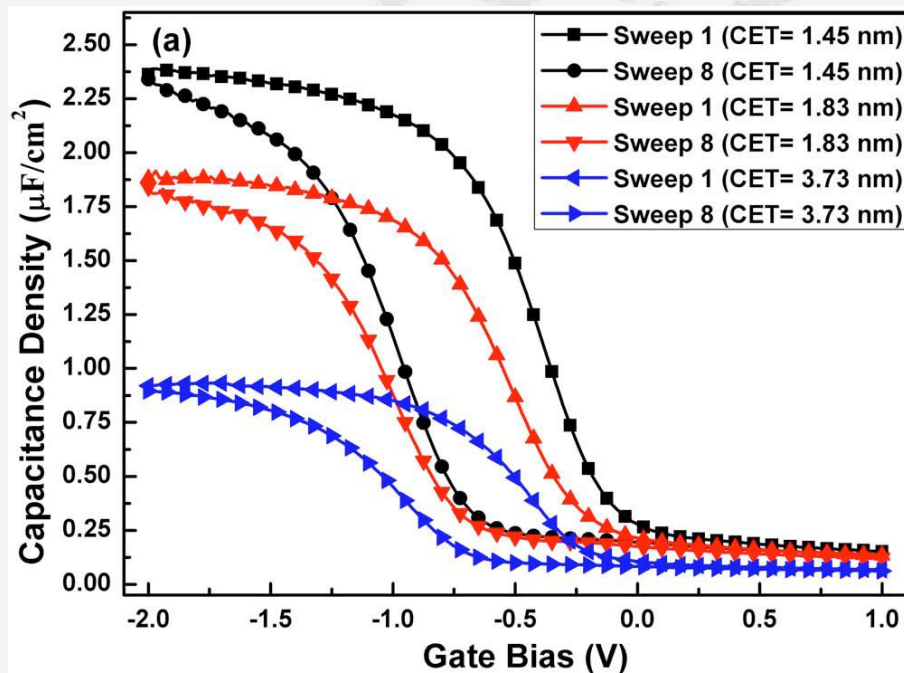
EE669: VLSI Technology

Apurba Laha
Department of Electrical Engineering
IIT Bombay 400076

Email: laha@ee.iitb.ac.in, Tel: 022 25769408

Office hour: Friday 10:00 – 11.00 AM, EE Annex, Room: 104

MOS-Interface instability



a C-V characteristics of single crystalline Gd₂O₃ on Si(100) substrate with Pt as top electrode. b Normalized C-V characteristics of single crystalline Gd₂O₃ on Si100 substrate with W top electrode

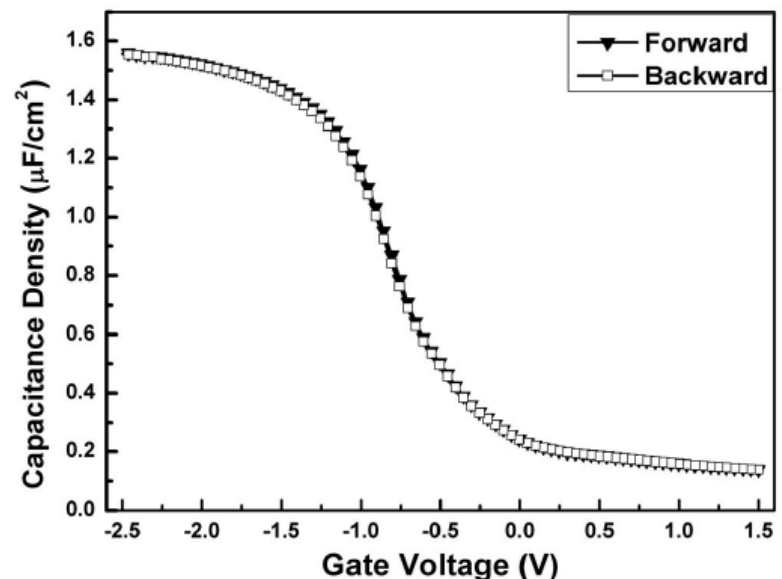
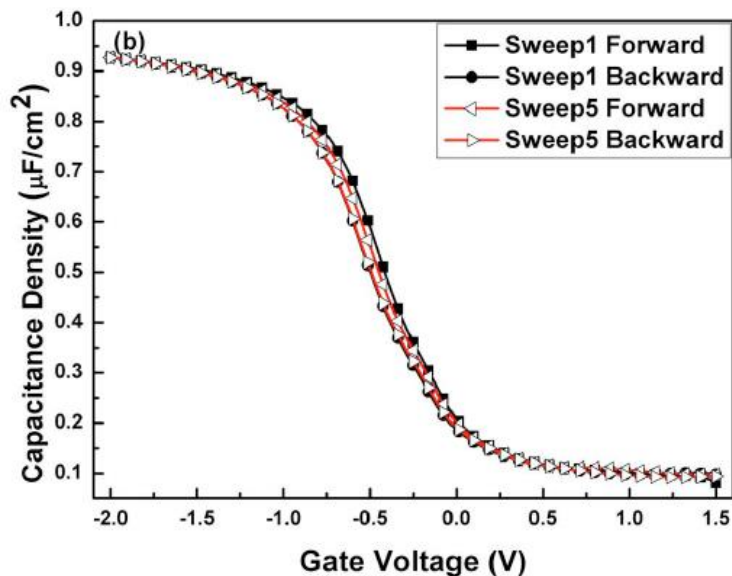
Effective passivation of slow interface states at the interface of single crystalline Gd_2O_3 and $\text{Si}(100)$

Qing-Qing Sun,¹ Apurba Laha,² Shi-Jin Ding,^{1,a)} David Wei Zhang,^{1,a)} H. Jörg Osten,² and A. Fissel³

¹State Key Laboratory of ASIC and System, Department of Microelectronics, Fudan University, Shanghai 200433, People's Republic of China

²Institute of Electronic Materials and Devices, Leibniz University, Appelstr. 11A, D-30167 Hannover, Germany

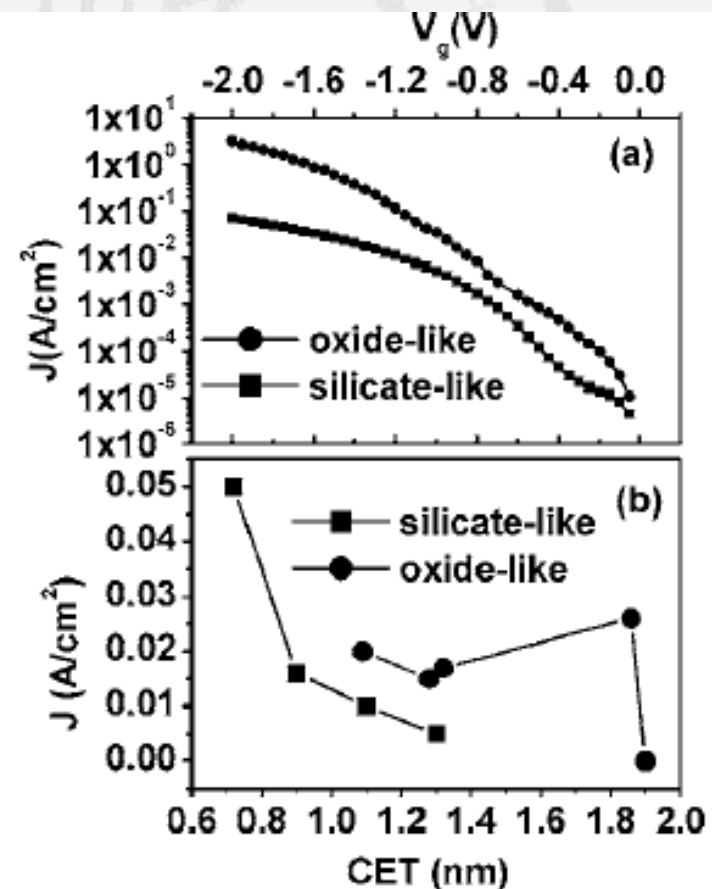
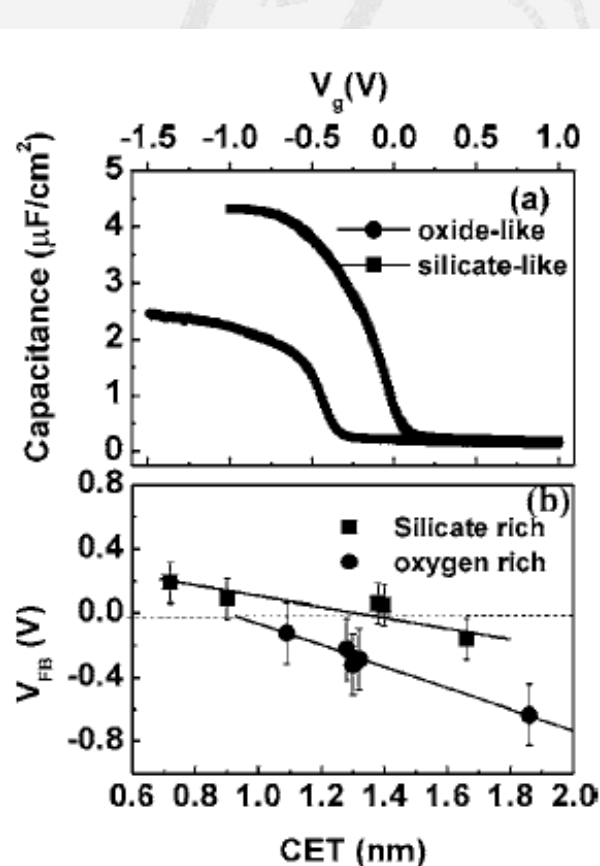
³Information Technology Laboratory, Leibniz University, Schneiderberg, 32, D-30167 Hannover, Germany



Influence of interface layer composition on the electrical properties of epitaxial Gd_2O_3 thin films for high- K application

Apurba Laha^{a)} and H. J. Osten^{b)}

Institute of Electronic Materials and Devices, Leibniz University of Hannover, Appelstr. 11A, D-30167 Hannover, Germany

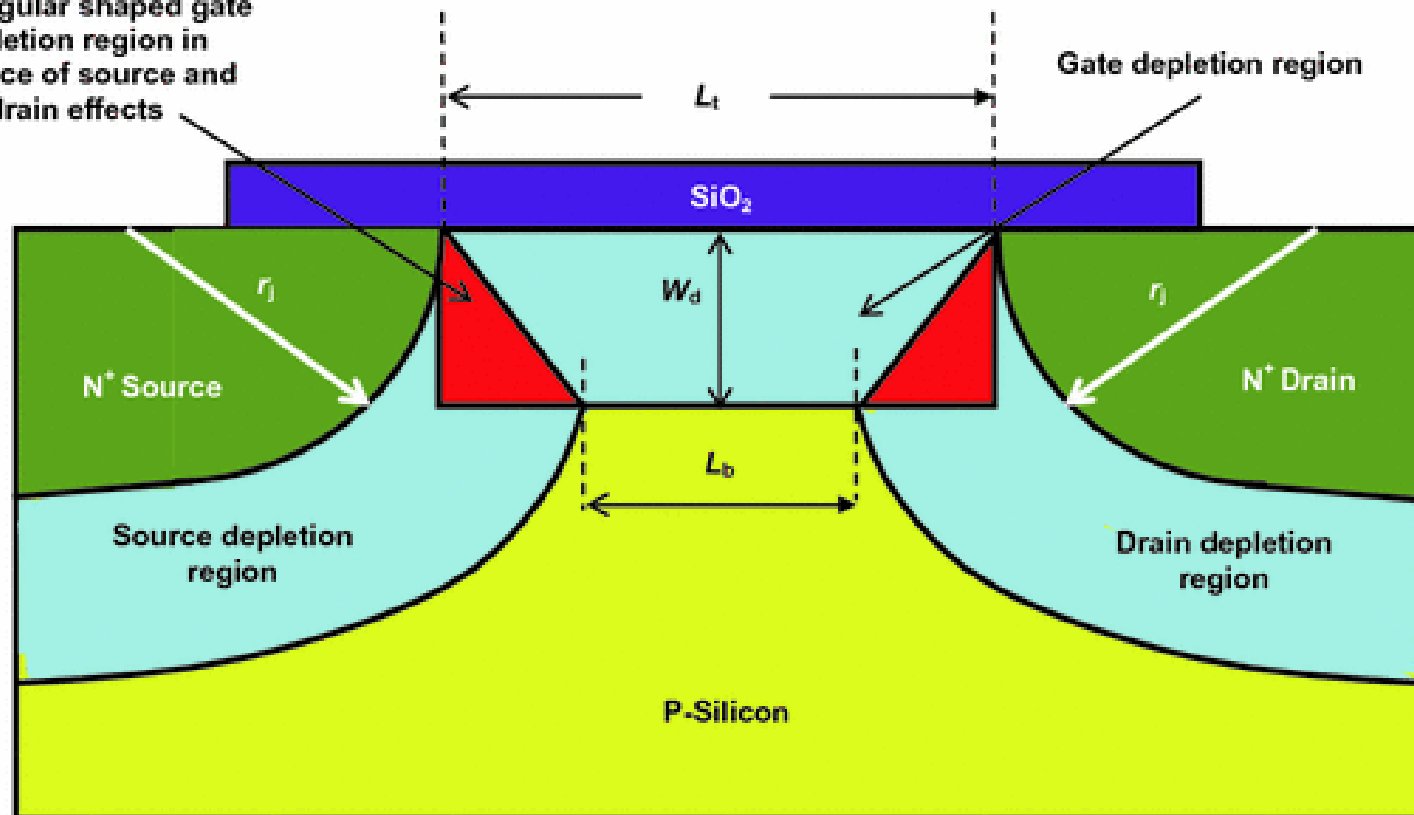


Short channel effect

Control of threshold voltage

$$I_D = \frac{\mu C_{ox}}{L_{ch}} (V_G - V_{th}^*)^2$$

Rectangular shaped gate depletion region in absence of source and drain effects



Short Channel Effect: V_{th} Roll-off

$$V_{th} = 2\phi_F - \frac{Q_B}{C_{ox}} = 2\phi_F + \frac{qN_A W_T}{C_{ox}}$$

