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Surface and trapped charge characterization of epitaxial oxides for applications in graphene electronics[1] BLAKE RIDDICK, BRAD CONRAD, WILLIAM MINSHEW, WILLIAM CULLEN, ELLEN WILLIAMS, Physics Department, University of Maryland, College Park, MD 20742, TASSILO HEEG, DARRELL SCHLOM, Department of Materials Science and Engineering, Cornell University, Ithaca, NY 14853; currently at Pennsylvania State University — Trapped charges have been shown to play an important role in the transport properties of graphene supported on SiO_2, and surface roughness may also play a role. Alternative substrate materials, Sc_2O_3 ($\varepsilon \sim 14$, $n \sim 1.9$) and Gd_2O_3 ($\varepsilon \sim 22$, $n \sim 2$) were grown epitaxially by molecular beam epitaxy on Si(111) over a range of thicknesses from 2 nm to 100 nm. AFM measurements yield rms roughness, and correlation function analysis reveals the nature of the long range order. For Sc_2O_3, the roughness is strongly thickness dependent, with root-mean-square height 0.26 nm^2 for a 20 nm thick film and 0.55 nm^2 for a 65 nm thick film; however, the correlation exponent ($2H \sim 1$) and correlation length ($\xi \sim 20$ nm) are the same. The roughness characterization for the full range of thicknesses of both oxides will be presented. In addition, frequency-dependent CV measurements are underway to determine the trapped charge densities. [1] supported by a NRI supplement to the UMD-NSF-MRSEC grant # DMR 0520471.

Blake Riddick
Physics Department, University of Maryland, College Park, MD 20742

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