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Cathodoluminescence Study of Hafnium Oxide EMILY PURCELL, ROBERT HENGEHOLD, JOHN MCCLORY, Air Force Institute of Technology —
Hafnium dioxide (HfO2) is increasingly being used in place of silicon oxide as a gate insulator in field effect transistors. This is primarily due to its high dielectric constant, κ, of 25. Samples of HfO_2 were grown by either atomic layer deposition (ALD) or pulsed laser deposition (PLD), with the PLD samples having assorted substrate temperatures during deposition (300 $^\circ$C, 500 $^\circ$C, and 750 $^\circ$C). Cathodoluminescence (CL) was chosen as the technique used for studying these HfO_2 samples. The CL system used was capable of beam energies ranging from 1 keV to 20 keV and beam currents ranging from 10 μA to 50 μA. A Monte Carlo calculation using CASINO software was performed in order to determine the beam energy for the desired depth of penetration. Measurements were taken at sample temperatures ranging from 7K (closed cycled cryostat) to 300K (room temperature), as well as at various beam energies and beam currents. Comparison will be made between the PLD and ALD spectra.

Robert Hengehold
Air Force Institute of Technology

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