Abstract Submitted
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On the Origins of Non-Exponential, Pulse Bias Induced, Capacitance Transients in Semiconductor PN Junctions[1] WALTER R. BUCHWALD, PETER J. DREVINSKY, Air Force Research Laboratory/Sensors Directorate, CHRISTIAN P. MORATH, Sandia National Laboratories — This work presents an analytical investigation of the temporal dependence of the pulse bias induced capacitance transient associated with an abrupt semiconductor PN junction. With minimal assumptions, Poisson's equation is used to derive a general equation for the capacitance transient which reduces to the expected exponential form only at low defect concentrations. The effect of this non-exponential transient on deep level transient spectroscopy experiments is investigated. It is shown that with increasing defect concentration, shifts in DLTS peak height maxima with respect to temperature are expected. Simulations also reveal that under certain conditions, deep level transient spectroscopy peak heights can have different magnitudes even though the defects producing the peaks have identical defect concentrations. The experimental conditions over which this general, non-exponential form, can be replaced by the purely exponential approximation are also reported.

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