Violation of the rate-window concept in the charge deep-level transient spectroscopy using second-order filtering

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I Thurzo[1,3], D R T Zahn[1] and A K Dua[2]
[1] Institut für Physik, TU Chemnitz, D-09107 Chemnitz, Germany
[2] Novel Materials and Structural Chemistry Division, Bhabha Atomic Research Centre, Mumbai-400 085, India
[3] Author to whom any correspondence should be addressed.

Abstract. When applying the thermal-scan charge deep-level transient spectroscopy (Q-DLTS) utilizing second-order filtering to diamond- or GaAs-based Schottky-like diodes, we found correlated Q-DLTS signals which increased monotonically with temperature and did not depend on the rate window set at t_1^{-1}. In accordance with the hyperbolic kinetics of the transient current in diamond films, the related transient charge $Q(t)$ (integrated current), when correlated, is *invariant* for the rate window. Thermal activation energy of the transient current is easily deduced from the Q-DLTS experiment. Possible consequences for feedback-charge capacitance–voltage measurements, which may also be classified as second-order filtering in the time domain, are pointed out. One of them might be a sign reversal of the excess capacitance at short times of observation.

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