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A Theoretical Model of Single Photon Source at Room Temperature AHMED ELHALAWANY, MICHAEL LEUENBERGER, University of Central Florida — In this work we present a theoretical model for an electrically injected single photon source at room temperature. The source is made of three regions. The region containing the source is n-doped, the middle region is an intrinsic semiconductor heterostructure. The region containing the drain is p-doped. The configuration of the intrinsic region is designed to trap a single pair of electron and hole; this is due to Pauli Exclusion Principle and Coulomb blockage. This is achieved by applying a reverse voltage to neutralize the intrinsic electric field between the n- and p-doped regions. Based on the calculated tunneling time of the electron/hole, the reverse voltage will be switched oœ. For the kinetics at the room temperature operation is calculated by means of the Master equations. For this we use an effective Hamiltonian in the tight-binding approximation. The results show that a single electron and a single hole are trapped simultaneously for an adequate period of time until they recombine.

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