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标题: A novel method to clarify nonlinear equivalent circuits of tunnel diodes by extracting rate constants for nonequilibrium electrons
作者: Asakawa, K (Asakawa, Kiyoto); Kurakami, Y (Kurakami, Yuji); Saito, M (Saito, Mitsufumi); Suhara, M (Suhara, Michihiko)
编者: Walther M
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摘要: Compound semiconductor resonant tunneling diodes (RTDs) have been studied aiming at realizing high speed devices in the terahertz range. An ultimate property of such a high-speed operation is limited by nonlinear transport physics of electrons. Recently we found both quantum inductance and quantum capacitance, which are intrinsically involved in an equivalent circuit expression of RTDs, are given by rate constants for nonequilibrium electrons. This paper is aiming at clarification of the nonlinear equivalent circuit by extracting effective escape rate constants from measured admittance of tunnel diodes. Especially InGaAs/InAlAs triple-barrier RTDs were examined and nonlinear voltage dependency of quantum inductance and quantum capacitance was experimentally clarified. (C) 2011 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim
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地址: [Asakawa, Kiyoto; Kurakami, Yuji; Saito, Mitsufumi; Suhara, Michihiko] Tokyo Metropolitan Univ, Dept Elect & Elect Engn, Hachioji, Tokyo 1920397, Japan
通讯作者地址: Asakawa, K (通讯作者),Tokyo Metropolitan Univ, Dept Elect & Elect Engn, 1-1 Minami Ohsawa, Hachioji, Tokyo 1920397, Japan
电子邮件地址: asakawa-kiyoto@ed.tmu.ac.jp
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