

标题: Intrinsic oscillations of spin current polarization in a paramagnetic resonant tunneling diode

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来源出版物: PHYSICAL REVIEW B 卷: 86 期: 16 文献号: 165318 DOI: 10.1103/PhysRevB.86.165318 出版年: OCT 15 2012

在 Web of Science 中的被引频次: 0

被引频次合计: 0

引用的参考文献数: 47

摘要: A spin- and time-dependent electron transport has been studied in a paramagnetic resonant tunneling diode using the self-consistent Wigner-Poisson method. Based on the calculated current-voltage characteristics in an external magnetic field, we have demonstrated that under a constant bias both the spin- up and spin- down current components exhibit the THz oscillations in two different bias voltage regimes. We have shown that the oscillations of the spin-up (down) polarized current result from the coupling between the two resonance states: one localized in the triangular quantum well created in the emitter region and the second localized in the main quantum well. We have also elaborated the one-electron model of the current oscillations, which confirms the results obtained with the Wigner-Poisson method. The spin current oscillations can lower the effectiveness of spin filters based on the paramagnetic resonant tunneling structures and can be used to design the generators of the spin polarized current THz oscillations that can operate under the steady bias and constant magnetic field.

入藏号: WOS:000309810300007

语种: English

文献类型: Article

KeyWords Plus: CURIE-TEMPERATURE; EXCHANGE; SYSTEMS; FERROMAGNETISM; SEMICONDUCTORS; BISTABILITY; HYSTERESIS; SCHEME; GAN

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出版商: AMER PHYSICAL SOC

出版商地址: ONE PHYSICS ELLIPSE, COLLEGE PK, MD 20740-3844 USA

Web of Science 类别: Physics, Condensed Matter

研究方向: Physics

IDS 号: 020LP

ISSN: 1098-0121

29 字符的来源出版物名称缩写: PHYS REV B

ISO 来源出版物缩写: Phys. Rev. B

来源出版物页码计数: 9