) in Pd and Au metals has been performed. It is found that at low temperatures, intrinsic SHC..." href="http://www.vjnano.org/getabs/servlet

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Self-sustained spin-polarized current oscillations in multiquantum well structures

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Ramón Escobedo
Departamento de Matemática Aplicada y Ciencias de la Computación, Universidad de Cantabria, 39005 Santander, Spain.

Manuel Carretero

Luis Bonilla

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Nonlinear transport through diluted magnetic semiconductor nanostructures is investigated. We have considered a II–VI multiquantum well nanostructure whose wells are selectively doped with Mn. The response to a dc voltage bias may be either a stationary or an oscillatory current. We have studied the transition from stationary to time-dependent current as a function of the doping density and the number of quantum wells. Analysis and numerical solution of a nonlinear spin transport model shows that the current in a structure without magnetic impurities is stationary, whereas current oscillations may appear if at least one well contains magnetic impurities. For long structures having two wells with magnetic impurities, a detailed analysis of nucleation of charge dipole domains shows that self-sustained current oscillations are caused by repeated triggering of dipole domains at the magnetic wells and motion towards the collector. Depending on the location of the magnetic wells and the voltage, dipole domains may be triggered at both wells or at only one. In the latter case, the well closer to the collector may inhibit domain motion between the first and the second well inside the structure. Our study could allow design of oscillatory spin-polarized current injectors. ©2009

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