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Spin-current detector by a periodic array of quantum dots with Rashba Hamiltonian JUN-QIANG LU, X.-G. ZHANG, Center for Nanophase Materials Sciences, and Computer Science and Mathematics Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, SOKRATES T. PANTELIDES, Department of Physics and Astronomy, Vanderbilt University, Nashville, TN 37235 and Oak Ridge National Laboratory, Oak Ridge, TN 37831 — Electron diffraction by a periodic array of quantum dots is studied using the Rashba Hamiltonian and a plane wave-based Green function method. A transverse charge current is found due to the asymmetric spatial diffraction of a spin-polarized electron injection. The spin-polarization of the forward electron current is maintained after passing through the array. Such an array can be used as a non-magnetic spin-current detector. Detailed results in terms of the parameters relevant to experimental design, such as the size of the quantum dots, strength of the spin-orbit coupling, are presented.

Center for Nanophase Materials Sciences, and Computer Science and Mathematics Division, Oak Ridge National Laboratory

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