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QUANTUM POINT CONTACT SIMULATIONS ON ISIS STRUCTURE

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ABSTRACT

In the work a numerical method of dissolving the Poisson equation in an electrostatically formed Quantum Point Contact (QPC) is described. Such a device is based on the structure called ISIS (Inverted Semiconductor Insulator Semiconductor). This structure was proposed in 1991 by Kastner [1] who made single electron transistor in it. In this paper the Poisson equation is solved by means of boundary elements method [2] with functions of the single layer potential [3] whose result provides potential distributions of the QPC device. The electronic properties of the QPC model are found by the use of Green functions method [4]. The interaction between structure and two leads is described by self-energy method [5]. The QPC conductance is calculated with the help of Landauer formula, after the Green's function corresponding to device Hamiltonian is evaluated.