

Spin injection in spin FETs using a step-doping profile

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Abstract

We investigate the effect of a step-doping profile on the spin injection from a ferromagnetic metal contact into a semiconductor quantum well in spin field-effect transistors using a Monte Carlo model. The considered scheme uses a heavily doped layer at the metal-semiconductor interface to vary the Schottky barrier shape and enhance the tunneling current. It is found that spin flux (spin current density) is enhanced proportionally to the total current, and the variation of current spin polarization does not exceed 20%.

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Keywords

Injection, Schottky barrier, Spin, Spin field-effect transistor (FET), Spintronics