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Spin injection into ferromagnetic insulators SABURO TAKAHASHI, Institute for Materials Research, Tohoku University, Sendai 980-8577, Japan, JUNICHIRO OHE, HIROTO ADACHI, SADAMICHI MAEKAWA, Advanced Science Research Center, Japan Atomic Energy Agency, Tokai 319-1195, Japan — Spin current in a junction of a normal metal and a ferromagnetic insulator is theoretically studied. At the interface, spins of conduction electrons in a normal metal interact with localized spins in ferromagnetic insulator through the exchange interaction. When a spin accumulation is present in the normal metal, accumulated spins decay into magnons via spin-flip scattering of conduction electrons at the interface, thereby creating a magnon spin current in the ferromagnet. Using the linear response theory, we calculate the spin current across the interface and find that spin accumulation plays a role of spin voltage for generating the spin current thorough the junction. Using the spin Hall effect, the spin current injection from a normal metal into a ferromagnetic insulator is demonstrated. We also discuss the spin current in the presence of temperature difference between the normal metal and the ferromagnetic insulator.

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