Spin valve effect in two-dimensional VSe_2 system

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Vanadium based dichalcogenides, VSe_2, are two-dimensional materials in which magnetic V atoms are arranged in a hexagonal lattice and are coupled ferromagnetically within the plane. However, adjacent atomic planes are coupled antiferromagnetically [1]. This provides new and interesting opportunities for application in spintronics and data storage devices. A spin valve magnetoresistance may be achieved when magnetic moments of both atomic planes are forced to parallel alignment by an external magnetic field. The resistance change associated with the transition from antiparallel to parallel alignment is qualitatively similar to that observed in magnetic metallic layerd structures. Detailed electronic structure was obtained from DFT calculations. Then, the ballistic spin-valve magnetoresistance was determined within the Landauer formalism.

References:

[1] Wen-Yi Tong and Chun-Gang Duan, npj Quantum Materials 2, 47 (2017)

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