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Spin injection in Silicon LOUIS GRENET, MATTHIEU JAMET, PIERRE NOÉ, PATRICK WARIN, YVES SAMSON, CEA/INAC/SP2M TEAM
— Spintronic aims at manipulating both charge and spins in semiconductors. It thus requires a robust scheme for injecting polarized current into these materials. Spin injection into GaAs has already been demonstrated optically. However few works have been published so far dealing with spin injection into Silicon although it is the core material for potential application and a very promising material for spin polarized transport because of very long spin lifetimes expected. We present results obtained on spin injection from a ferromagnetic layer to Silicon. A SiGe quantum well embedded in a Si diode is used to optically detect spin-polarized electrons. The spin of the electrons are aligned when going through a CoPt electrode with perpendicular magnetization and are injected through an alumina tunnel barrier to prevent depolarization due to conductance mismatch with Silicon. The remanent configuration of the electrode magnetization allows us to study spin injection without applying a magnetic field, avoiding spurious effects such as Faraday rotation of the light in Silicon. Light polarization of more than 3 percent has been measured.

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