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Crossover from Spin Accumulation into Interface States to Spin Injection in the Germanium Conduction Band JUAN-CARLOS ROJAS-SANCHEZ, ABHINAV JAIN, MURAT CUBUKCU, INAC/SP2M, CEA and Université Joseph Fourier, JULIAN PEIRO, JEAN-CHRISTOPHE LE BRETON, CNRS-Thalès and Université Paris XI, ERIC PRESTAT, CÉLINE VERGNAUD, PASCALE BAYLE-GUILLEMAUD, LAURENT VILA, JEAN-PHILIPPE ATTANÉ, INAC/SP2M, CEA and Université Joseph Fourier, EMMANUEL AUGENDRE, LETI Minatec Campus, CEA, SERGE GAMBARELLI, INAC/SCIB, CEA and Université Joseph Fourier, HENRI JAFFRÈS, JEAN-MARIE GEORGE, CNRS-Thalès and Université Paris XI, MATTHIEU JAMET, INAC/SP2M, CEA and Université Joseph Fourier — Spin injection into semiconductors is crucial for exploring spin physics and new spintronic devices. Ge is of great interest for high carrier mobilities, long spin diffusion length and large spin-orbit coupling to perform electric field spin manipulation. However the exact role of interface states in spin injection mechanism in n-Ge has not been clarified yet. Here we show a clear transition from spin accumulation into interface states to spin injection in the Ge conduction band. For this purpose, we have grown CoFeB/MgO as a spin injector on Germanium On Insulator. We observe spin signal amplification at low temperature due to spin accumulation into interface states. At 150 K, we find a clear transition to spin injection in the conduction band up to room temperature: the measured spin signal is compatible with the spin diffusion model. We could in particular demonstrate spin signal modulation applying a back gate voltage and spin-pumping by the ferromagnetic resonance of the CoFeB layer which are clear manifestations of spin accumulation in the Ge conduction band.

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