Ferromagnetic single-electron transistors fabricated by atomic force microscopy\textsuperscript{1} RUISHENG LIU, HAKAN PETTERSSON, Center for Applied Matematics and Physics, Halmstad University, Sweden, LUKASZ MICHAL-LAK, CARLO CANALI, Div. of Physics Dept of Chemistry and Bimedical Sciences, Kalmar University, Sweden, LARS SAMUELSON, Solid State Physics/Nanometer Consortium, Lund University, Sweden — We report on the fabrication and magneto-transport measurements of Ni/Au/Ni ferromagnetic single-electron transistors (F-SETs), fabricated by atomic force microscopy. By positioning a single Au disc (30 nm in diameter) into the gap between the Ni drain and source electrodes (of width 220 nm and 80 nm, respectively) step-by-step with Angstrom precision, and using plasma-processed NiO\textsubscript{x} as tunneling barriers, we can successfully fabricate F-SETs of high quality and substantial stability. The characteristic time interval of the device between two successive tunneling events is $\sim 10$ps. The absence of any clear features in the transport related to the applied external magnetic field indicates that no spin-accumulation is maintained in the central Au disc. This interesting result indicates that the spin-relaxation time inside the central island should be shorter than 10ps. Based on these findings, we will discuss possible mechanisms of spin-relaxation in metal nano-structures triggered by spin-orbit interaction.

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