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All-electrical spin injection and detection in an AlGaN/GaN two-dimensional electron gas[1] D.R. HOY, Department of Physics, The Ohio State University, Columbus, OH, Y. PU, Department of Physics and Center for Emergent Materials, The Ohio State University, Columbus, OH, S.D. CARNEVALE, Department of Materials Science and Engineering, The Ohio State University, Columbus, OH, E. JOHNSTON-HALPERIN, Department of Physics and Center for Emergent Materials, The Ohio State University, Columbus, OH, R.C. MYERS, Department of Physics and Department of Materials Science and Engineering, The Ohio State University, Columbus, OH — Materials with low spin-orbit coupling, including wide band gap semiconductors, may allow practical semiconductor spintronics. Here we investigate all-electronic spin injection and detection using ferromagnetic Fe electrodes on a polarization doped AlGaN/GaN two-dimensional electron gas (2DEG) grown by molecular beam epitaxy. The ultrathin AlGaN cap provides polarization doped electrons and serves as a thin tunnel barrier for spins. The surface morphology is characterized by atomic force microscopy and the electron density, resistivity, and mobility are characterized by Hall measurements. Through the Hanle effect, we investigate the dependence of the spin injection efficiency and spin lifetime with temperature and bias.

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