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Nanosecond spin relaxation times in single layer graphene spin valves with hexagonal boron nitride tunnel barriers. JINSONG XU, SIMRANJEET SINGH, JYOTI KATOCH, The Ohio State University, CHENG TAN, Columbia University, TIANCONG ZHU, The Ohio State University, WALID AMAMOU, University of California, Riverside, JAMES HONE, Columbia University, ROLAND KAWAKAMI, The Ohio State University — We present an experimental study of spin transport in single layer graphene using atomic sheets of hexagonal boron nitride (h-BN) as a tunnel barrier for spin injection. While h-BN is expected to be favorable for spin injection, previous experimental studies have been unable to achieve spin relaxation times in the nanosecond regime. Here, we investigate spin relaxation in graphene spin valves with h-BN barriers and observe room temperature spin lifetimes in excess of a nanosecond, which provides experimental confirmation that h-BN is indeed a good barrier material for spin injection into graphene. By carrying out measurements with different thicknesses of h-BN, we investigate the range of h-BN thickness required to observe large MR signals and higher spin relaxation times in graphene spin valves. Our measurements suggest that monolayer h-BN may not be the optimal choice for efficient spin injection, while thicker h-BN allows the realization of larger MR signals and longer spin relaxation times in graphene spin valves.

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