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Control and measurements of spin and carrier dynamics in InAs films[1] KANOKWAN NONTAPOT, Virginia Tech, RAJEEV KINI, GITI KHODAPARAST, Department of Physics, Virginia Tech, LOUIS GUIDO, Department of Electrical Engineering and Material Science and Engineering, Virginia Tech, ROGER WELSER, Kopin Corporation — In light of the growing interest in spin-related phenomena and devices, there is now renewed interest in the science and engineering of narrow gap semiconductors. We report control and measurements of spin and carrier relaxations in InAs (100) and InAs (111) films with doping densities of $\sim$ 3x10^{12} cm^{-2} (mobility $\sim$20,000 cm^2/Vs at 77 K) and 2.0x10^{12} cm^{-2} (mobility $\sim$33,00 cm^2/Vs at 77 K) at room temperature and 77K, respectively. We use standard pump-probe and magneto-optical Kerr effect (MOKE) spectroscopy at different excitation wavelengths, power densities, and temperatures. Spin relaxations in these structures demonstrate dynamics which is different from the carrier relaxations under the same experimental conditions. We explain our results using the Elliot-Yafet picture which is considered to be the dominant relaxation process in narrow gap semiconductors.

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