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Low temperature annealing and spin injection in Fe/AlGaAs Spin-LEDs A.T. HANBICKI, G. KIOSEOGLOU, R. GOSWAMI, T.J. ZEGA, C.H. LI, R.M. STROUD, G. SPANOS, B.T. JONKER, Naval Research Laboratory — With the Fe/AlGaAs/GaAs spin-LED system, it is now routine to obtain electron spin polarizations of up to 32% in the GaAs quantum well. Because the nature of the interface between a magnetic contact and a semiconductor is expected to influence the spin-injection efficiency we have undertaken an annealing study to isolate the role of the Fe/AlGaAs interface on the overall spin injection efficiency. Optimized annealing can improve the measured spin polarization, therefore multiple pieces of a single sample can be annealed to generate a systematic dataset. Enhancement in polarization is seen with anneals as low as 175°C, and the maximum increase in polarization occurs for anneals above 200°C. Upon annealing, there is a net gain in measured spin polarizations of 8 to 10 percentage points independent of the starting value. Details on changes in parameters affected by annealing such as the magnetization, polarization, I-V characteristics, and interface structure will be presented. The role of the interface on changes in these parameters will be discussed. This work was supported by the DARPA SpinS program and ONR.

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