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Magnetic studies of ion-implanted p-GaN, $Al_{0.35}Ga_{0.65}N$, and ZnO with transition metals JEREMY RALEY, YUNG KEE YEO, Air Force Institute of Technology, MEE-YI RYU, University of Dayton Research Institute, ROBERT HENGEHOLD, Air Force Institute of Technology, TODD STEINER, Air Force Office of Scientific Research, PAN WU, YICHENG LU, Rutgers University — Examination of the viability of ion-implantation for creating dilute magnetic semiconductors with ferromagnetic properties persisting to room temperature has been undertaken. Samples of *p*-GaN, $Al_{0.35}Ga_{0.65}N$ and ZnO (film and nanotips) have been implanted with Fe, Mn and Cr at doses of 5×10^{16} cm^{-2} and Ni at 3×10^{16} cm^{-2}. The samples were annealed at temperatures ranging from 600 to 800° C. The GaN and AlGaN samples were annealed in flowing N_2 for 5 min, and the ZnO samples in flowing O_2 for 10 min to determine the effect of annealing temperature. Using a superconducting quantum interference device (SQUID) magnetometer, we quantify ferromagnetism by the magnitude of coercive fields and show that an optimum annealing temperature is reached and passed within the range tested for a majority of the material/dopant combinations. Finally, we measure field-cooled and zero-field-cooled magnetization versus temperature.

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