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Doping is Good: Enhancing Hall-Effect Sensor Performance with Doped Bismuth RICKY CHU, Simon Fraser University, NIGEL DAVID, University of Victoria, TARAS CHOUINARD, Simon Fraser University, ADAM SCHNEIDER, McGill University, DAVID BROUN, Simon Fraser University — Hall-effect sensors are quantitative magnetic flux detectors with sensitivity comparable to that of superconducting quantum interference devices (SQUIDs), but with superior spatial resolution [S.J. Bending, Adv. Phys. **48**, 449 (1999)]. Applications of Hall sensors include the imaging of microscopic magnetic structures such as vortices in superconductors, nanoscale domains in magnetic thin films, and nanoparticles in bioassay samples. Bismuth is being tested as a Hall probe material in order to avoid problems associated with excess noise, which arise in semiconductor Hall sensors as they are miniaturized [A. Sandhu *et al*, Jpn. J. Appl. Phys. **40**, L524 (2001)]. However, bismuth is a compensated metal, and the presence of both electrons and holes reduces its native sensitivity due to cancellations in the Hall coefficient. We present experimental results for thin films and sensors that show hole doping by Pb can be used to empty the electron band, thereby breaking the compensation and increasing flux sensitivity.

Ricky Chu
Simon Fraser University

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