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Directed self-assembly and detection of iron oxide nanoparticles on an InAs quantum well micro-Hall sensor P. MANANDHAR, G. MIHAJLOVIC, W. SETYAWAN, S. VON MOLNAR, P. XIONG, MARTECH & Dept of Phys, Florida State University, S. HONG, Physics and NANO Systems Institute, Seoul National University, D. MAGANA, G. F. STROUSE, Dept of Chem and Biochem, Florida State University, K. OHTANI, H. OHNO, Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University, M. FIELD, G. J. SULLIVAN, Rockwell Scientific Company LLC — Biosensors based on magnetic detection of superparamagnetic nanoparticles have potential in many bioanalysis and biomedical applications. An important step towards this goal is to assemble magnetic nanoparticles precisely on a sensing device and detect them. Here we demonstrate directed self-assembly of superparamagnetic iron oxide nanoparticles onto a micron or sub-micron sized semiconductor Hall sensor and their detection at room temperature using Hall magnetometry. Hall devices were fabricated from MBE grown InAs quantum well heterostructures using lithographical methods. Organic molecular templates were created on Au coated active Hall cross regions using dip pen nanolithography (DPN) with 16- mercaptohexadecanoic acid (MHA). Magnetic nanoparticles were then assembled specifically onto the MHA regions and characterized by detecting stray magnetic fields emanating from the nanoparticles in the presence of a magnetizing field by using phase sensitive Hall magnetometry. *This work has been supported by NSF NIRT grant ECS-0210332.

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