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A novel flow cytometry configuration for the detection of magnetic microparticles. JOHN MARTIN, CHRISTOPHER CARR, ANDREI MATLACHOV, HENRIK SANDIN, MICHELLE ESPY, ROBERT KRAUS, Los Alamos National Laboratory — We have developed a technique for detecting magnetic microparticles in a novel laser-based flow cytometry configuration that incorporates a giant magnetoresistive (GMR) sensor. To achieve the highest possible sensitivity, it is advantageous to minimize the distance from the GMR sensor to the microparticle. Initially, we passed ferromagnetic microparticles (diameter <100 microns) through polymer capillary tubing that passed directly on top of the GMR. While the capillary tubing provides a controlled flow path, it imposes a standoff between the sensor and the microparticle that is never less than 200 microns (due to the tube wall thickness). This standoff limits the range of magnetic microparticles we can detect. Another proposed technique to achieve minimum standoff is to fabricate microfluidic flow channels on top of the GMR itself. We have developed a new approach for minimum standoff, which does not require microfluidics. We will describe this technique, discuss the performance of the commercial GMR sensor and finally report on the detection of magnetic microparticles in this new flow configuration.

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