

Development of a magnetic nanoparticles detection system

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Abstract

Magnetic Nanoparticles (MNPs) have many applications in the biomedical field ranging since manipulation biomaterial, drug delivery till the treatment of cancer by magnetic heating. MNPs when used as labels for biosensing have several advantages over other detection systems. How MNPs magnetic stickers have low toxicity. There are several solutions for measuring magnetic field. The magnetic sensors that use Superconducting Quantum Interference Devices (SQUIDS) measure the changes of the magnetic field with a gradiometer. Another possible solution to detect the magnetic field changes is as Hall effect sensors based on. In this work was developed an embedded system for detection of magnetic nanoparticles in the sensor using Hall effect. The prototype has a sensitivity of 1,8mV/G and consists of a component continuous magnetic field generator, a probe a microcontroller responsible for reading and processing of data obtained by the sensor and a display for viewing system. Figure 1 shows the system developed calibrated to a 43 Gauss field. It was inserted a sample of 0,1ul of magnetite in the system and we obtained a answer of 46 Gauss, which indicates the presence of magnetic nanoparticles. The system is being evaluated using several blood typing in various nanoparticle concentrations to determine the sensitivity and performance for in vivo application in the study of the dynamics of blood vessels.

References

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Figures

Figure 1. Prototype system developed

