Analysis of Magnetic Field Distribution of Multibit Magnetic Tags in Microfluidic Cells

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Very recent efforts have concentrated on performing assays in microfluidic flow cells using micron-sized labels functionalized with biochemical probes [1,2]. This method allows flexible, automated, high-throughput analysis, whose detection capabilities can be extended simply by increasing the size of the library of probes rather than the number of sites in the microarray. Recently, we have demonstrated planar micrometer-sized multi-bit magnetic tags capable of being encoded and decoded remotely for performing multiplexed high-throughput bioassays, i.e. multibit magnetic tags comprising a magnetic barcode formed by an ensemble of micron-sized thin film ferromagnetic bars and a Au square for immobilization of probe molecules have been designed and fabricated. In this study, we have investigated design of solid support based planar multibit magnetic tags which is optimized for real time analysis using magnetic field sensor embeded in microfluidic cells. We have used three dimensional maxwell software to calculate the distribution of magnetic stray field generated by multibit magnetic tags. Fig. 1 shows color map of stray field distribution around multibit magnetic tags and corresponding line profile of magnetic field at the flying height of 5 μm. Details of optimization process include flying height dependence, inter-pattern dependence will be reported in this presentation.

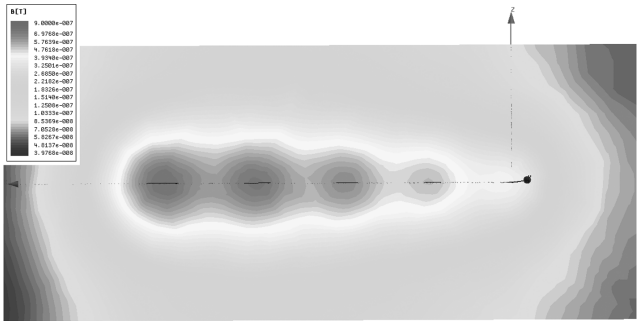

Fig. 1 Distribution of magnetic field around the array of ferromagnetic Fe bars.

[1] D.C. Pregibon *et al., Science* **315**, 1393 (2007).
[2] J.-R. Jeong *et al., Lab on a Chip* **8**(11), 1883 (2008).