AD04

Novel Multibit Magnetic Tagging Techniques for High-Throughput Multiplexed Chemical Analysis

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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]. 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. In this study, we present a new magnetic labelling technology for high-throughput biomolecular identification and DNA sequencing [2]. Microfabricated multi-bit magnetic tags comprising a magnetic barcode formed by an ensemble of ferromagnetic thin film Co bars and an Au square for immobilization of probe molecules have been designed and fabricated. We show that by using modest globally applied magnetic fields and magneto-optical Kerr microscopy, the magnetic elements in the multi-bit magnetic tags can be addressed individually and encoded/decoded remotely. The magnetic nature of the read/write technique allows almost unlimited numbers of codes to be written to populations of tags rather than individuals, and lends itself naturally to fast, remote decoding and the ability to rewrite tags if needed. It provide a fundamental insight into the high-throughput biological analysis by using magnetic labeling techniques, and open the path to further technological developments in this area.

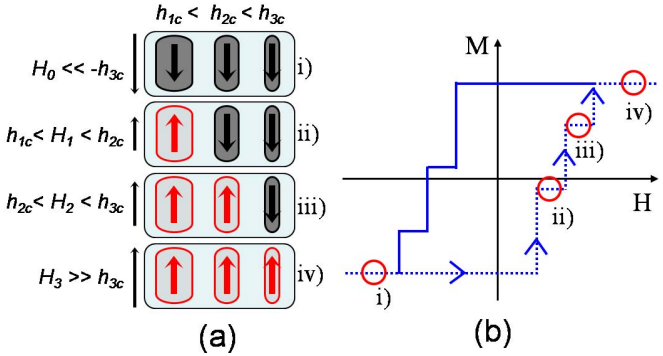

Fig. 1. Schematic diagram of the magnetic multibit tags (a) and corresponding magnetization states (b).

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AD05

Effects of Metal Ions on the Intrinsic DNA Magnetisms

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In this report, we presented an effect of various metal ions on the intrinsic magnetisms of A-DNA. For this purpose, Mn- and Mg-DNA were synthesized so that the metal ions bond to phosphate backbone at acetate buffer conditions, whereas Cu-and Ag-DNA prepared to be intercalated into base stacks of dsDNA. And then, in this report, we presented an effect of various metal ions on the intrinsic magnetisms of A-DNA. For this purpose, Mn- and Mg-DNA were synthesized so that the metal ions bond to phosphate backbone at acetate buffer conditions, whereas Cu-and Ag-DNA prepared to be intercalated into base stacks of dsDNA. And then, they were dried in freeze dryer connected to a vacuum oven. For each specimen, electron magnetic resonance (EMR) and SQUID magnetic measurements were carried out in the wide temperature ranges. Anomalously, the A-DNA with lower concentration of metal ions shown a weak ferromagnetic hystereses, but the DNA with high concentration of metal ions did only paramagnetic behaviors. In analysis, therefore, a certain type of interaction[1] between a helical charge transport along the dsDNA [2] and the metal ions was taken into account to understand the experimental magnetic data.

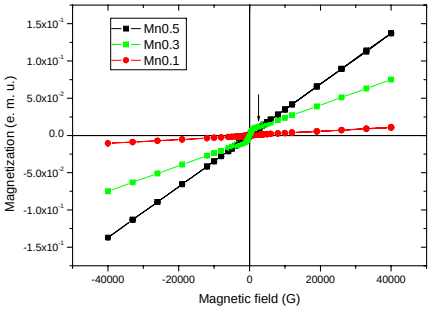

Fig. 1. SQUID magnetization-magnetic field curves obtained for Mn-DNAs with varying Mn concentrations.

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