Supporting Information:

Bio-Bar-Code-Based DNA Detection with PCR-like Sensitivity

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For the NPs, 5 mL of 300 pM NP solution was modified with two different DNA sequences [the ratio of thiolated bar-code binding DNA (300 μL of 42.3 μM) to thiolated target binding DNA (2.5 μL of 50.6 μM) is 100:1]. After 16 h, the resulting NP solution was gradually stabilized with 2 M NaCl to achieve 0.1 M NaCl concentration in 10 mM phosphate-buffered solution and purified by literature procedure.[S1]

For the MMPs (Polysciences, Incorporated, Warrington, PA), 1 mg of the polyamine-functionalized iron oxide particles were reacted with 100 μg of sulfosuccinimidyl 4-N-maleimidomethyl cyclohexane-1-carboxylate (sulfo-SMCC; Pierce, Milwaukee, WI) bifunctional linker that reacts with the primary amines on the MMPs and the thiol groups on the oligonucleotide which form the recognition agent for target DNA for 8 h in 0.1 M PBS solution. Then sulfo-SMCC-modified MMPs were linked with 2 mL of 5 μM alkylthiol-capped DNA for 8 h and the MMPs were washed with 0.1 M PBS solution three times. The resulting MMPs were passivated with 2 mL of 5 μM thiolated-A_{10} DNA in 0.1 M PBS solution for 8 h and washed with PBS buffer solution. Finally, the target binding DNA-modified MMPs were re-dispersed in 2 mL of 0.1 M PBS solution prior to use.

S1. Storhoff, J. J.; Elghanian, R.; Mucic, R. C.; Mirkin, C. A.; Letsinger, R. L. *J. Am. Chem. Soc.*, **1998**, *120*, 1959-1964.