

Label-free colorimetric detection of nucleic acids based on their shielding action against the peroxidase activity of magnetic nanoparticles

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We have developed a new and simple label-free colorimetric detection method of nucleic acids amplified by polymerase chain reaction (PCR) based on their shielding action against the recently invented peroxidase activity of magnetic nanoparticles (MNPs). The key element of our detection system is the MNPs synthesized by co-precipitation at an acceptable cost, which can generate colored products due to their peroxidase mimicking activity. In the presence of nucleic acids amplified by PCR, MNPs yielded reduced color signal compared to vivid colorimetric responses without nucleic acids since the amplified nucleic acids shielded the catalytic activity of MNPs. This color difference dependent on the nucleic acids in a sample could be easily detected with naked eye. By using this MNPs-based colorimetric detection system, we successfully quantified nucleic acids. The current assay is simple, cheap and doesn't require any sophisticated instrumentation. Moreover, MNPs can be easily reused by magnetic separation. Considering the advantages of this system, it has great potential as a point of care testing (POCT) sensor for the verification of the amplified nucleic acids.