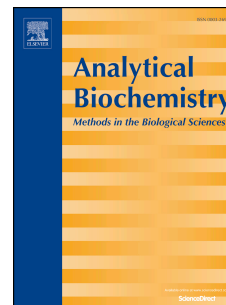


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**Comparative study of three magnetic nano-particles (FeSO₄, FeSO₄/SiO₂,
FeSO₄/SiO₂/TiO₂) in plasmid DNA extraction**

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Abstract

Recent updates on Magnetic Nano-Particles (MNPs) based separation of nucleic acids have received more attention due to their easy manipulation, simplicity, ease of automation and cost-effectiveness. It has been indicated that DNA molecules absorb on solid surfaces via hydrogen-bonding, and hydrophobic and electrostatic interactions. These properties highly depend on the surface condition of the solid support. Therefore, surface modification of MNPs may enhance their functionality and specification. In the present study, we functionalized Fe₃O₄ nano-particle surface utilizing SiO₂ and TiO₂ layer as Fe₃O₄/SiO₂ and Fe₃O₄/SiO₂/TiO₂ and then compare their functionality in the adsorption of plasmid DNA molecules with the naked Fe₃O₄ nano-particles. The result obtained showed that the purity and amount of DNA extracted by Fe₃O₄ coated by SiO₂ or SiO₂/TiO₂ were higher than the naked Fe₃O₄ nano-particles. Furthermore, we obtained pH 8 and 1.5 M NaCl as an optimal condition for desorption of DNA from MNPs. The result further showed that, 0.2 mg nano-particle and 10 min at 55 °C are the optimal conditions for DNA desorption from nano-particles. In conclusion, we recommended Fe₃O₄/SiO₂/TiO₂ as a new MNP for separation of DNA molecules from biological sources.

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