

# An innovative application of super-paramagnetic iron oxide nanoparticles for magnetic separation

Banis G., Kouli M., Ferraro A., Molino A., Karatza D., Chianese S., Musmarra D., Hristoforou E.  
*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

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## Abstract

© 2017, AIDIC Servizi S.r.l. In the last decades, iron oxide nanoparticle application has taken root in several technological fields, such as magnetic separation of biomolecules, biosensors, bio-fuel production, nano-devices and nano-adsorption. Various approaches can be found for the magnetic nanoparticle manufacturing. Among them a new technology to manufacture core-shell super-paramagnetic iron oxide nanoparticles (SPIONs), based on a vapour composition using single ion precursors, like cyclodextrines, has been recently developed. In this paper, we present the synthesis of functionalized SPIONs as well as the modelling for an innovative application of this magnetic nanotechnology. It consists on the use of SPIONs to trap target organic or inorganic molecules in a continuous-flow apparatus. SPIONs with proper ligands are immobilized on a magnetic surface. On that surface, the solution containing target molecules is circulated. We modelled the magnetic properties of the magnetic surface and SPIONs as well as the velocity of liquid needed in order to avoid removal of nanoparticles by the solution flow.

<http://dx.doi.org/10.3303/CET1760015>

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