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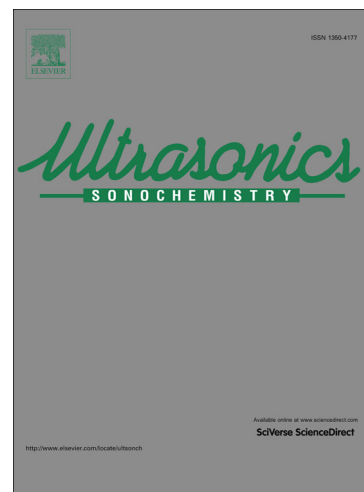
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## Low Intensity Sonosynthesis of Iron Carbide@Iron Oxide Core-Shell Nanoparticles

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**Abstract:** Here we demonstrate a simple method for the organic sonosynthesis of stable Iron Carbide@Iron Oxide core-shell nanoparticles (ICIONPs) stabilized by oleic acid surface modification. This robust synthesis route is based on the sonochemistry reaction of organometallic precursor like  $\text{Fe}(\text{CO})_5$  in octanol using low intensity ultrasonic bath. As obtained, nanoparticles diameter sizes were measured around  $6.38 \text{ nm} \pm 1.34$  with a hydrodynamic diameter around 25 nm and an estimated polydispersity of 0.27. Core-Shell structure of nanoparticles was confirmed using HR-TEM and XPS characterization tools in which a core made up of iron carbide ( $\text{Fe}_3\text{C}$ ) and a shell of magnetite ( $\gamma\text{-Fe}_2\text{O}_3$ ) was found. The overall nanoparticle presented ferromagnetic behavior at 4K by SQUID. With these characteristics, the ICIONPs can be potentially used in various applications such as theranostic agent due to their properties obtained from the iron oxides and iron carbide phases.

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