

**Carbon Double Coated Fe<sub>3</sub>O<sub>4</sub> Nanoparticles: Morphology Features, Magnetic Properties, Dye Adsorption**Deniz UNAL<sup>1</sup>

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**COMMENTARY**

The goal of this research is to look into the properties of attractive Fe<sub>3</sub>O<sub>4</sub> nanoparticles that have been double-coated with carbon. Warm decay was used to combine Fe<sub>3</sub>O<sub>4</sub>@C nanoparticles at first. Then, for the next 12 hours, these orchestrated nanoparticles of 20-30 nm in size were handled in a glucose solution at 200°C. Transmission electron microscopy, differential thermo-gravimetric investigation, vibrating test magnetometer, attractive round dichroism, and Mössbauer spectroscopy were used to describe the morphology and elements of the attractive properties of the obtained half breed nanoparticles. In comparison to the Fe<sub>3</sub>O<sub>4</sub> stage, the attractive centre of Fe<sub>3</sub>O<sub>4</sub>@C nanoparticles was found to be nano-translucent. The Fe<sub>3</sub>O<sub>4</sub>@C@C nanoparticles appear to contain Fe<sub>3</sub>O<sub>4</sub> stage (80%) with admixture of maghemite (20%), with a carbon shell thickness of around 2-4 nm in the main case.

An amazing idiosyncrasy of the Fe<sub>3</sub>O<sub>4</sub>@C@C nanoparticles is the development of extremely large nanoparticle aggregates with a straight size up to 300 nm and a similar standard shape. The adsorption of natural colours from water by the nanoparticles under investigation was also considered. Fe<sub>3</sub>O<sub>4</sub>@C@C nanoparticles were the most promising candidates for colour evacuation. The adsorption processes were linked to the pseudo-second request instrument for cationic colour methylene blue (MB) and anionic colour Congo red, according to the motor data (CR). With the Langmuir isotherm, the balance information was more predictable, and the Langmuir-Freundlich model accurately represented it.

The centre shell attractive nanoparticles, Fe<sub>3</sub>O<sub>4</sub>@C, were blended in a one-venture process using the warm deterioration strategy. The nanoparticles were used as a starting material for the Fe<sub>3</sub>O<sub>4</sub>@C@C twofold carbon covered NPs, which were created by warming them for 12 hours in a watery glucose solution at 200 degrees Celsius. The X-beam and electron diffraction data revealed that the magnetite Fe<sub>3</sub>O<sub>4</sub> precious stone design was present in the attractive centre of the Fe<sub>3</sub>O<sub>4</sub>@C NPs without the presence of any other stages. The majority of the NPs in this situation were round, with a normal crystallite size of 43 nm.

The undefined carbon shells had a thickness of a few nanometers. The Fe<sub>3</sub>O<sub>4</sub>@C NPs self-coordinated into enormous polyhedral combinations 200-300 nm in size with similar morphology as a result of the glucose treatment, resembling cushions in shape.

Along with the massive polyhedral combinations, various confined particles with an attractive centre of a similar size to the main case but an exceptionally thick carbon shell (around 7 nm) were observed. Fe<sub>3</sub>O<sub>4</sub> was found to be the most vitally attractive stage (roughly 80%) by XRD and Mössbauer spectroscopy, with -Fe<sub>2</sub>O<sub>3</sub> admixture (20 percent). Because of the presence of two stages, determining the crystallite size was difficult. Despite this, the XRD designs' correlation of the width of the appearance allowed us to accept that the crystallite measures in this situation were similar to those in carbon-coated NPs.

Under the novel conditions used, the results of the XRD, TEM, and magneto-static investigations suggested that these polyhedral aggregates rose around specific layouts made of connecting glucose atoms. It's worth noting the unusually high immersion charge Ms revealed by the attractive estimates. It was much higher for Fe<sub>3</sub>O<sub>4</sub>@C NPs than the Ms of the mass magnetite precious stone. The high Ms value of the considered nanomaterials can be viewed as a benefit because higher polarisation necessitates the use of more fragile attractive fields to control the cycles involving these materials.

**CONFLICT OF INTEREST**

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