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# Synthesis and characterization of an advanced layer-by-layer assembled Fe<sub>3</sub>O<sub>4</sub>/ polyaniline nanoreservoir filled with Nettle extract as a green corrosion protective system

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**Abstract:** This study aims at synthesis and characterization of a Fe<sub>3</sub>O<sub>4</sub> nanoreservoir (Fe<sub>3</sub>O<sub>4</sub>-NS) by an ultrasound assisted route through a layer-by-layer procedure. An active nanoreservoir was obtained through inclusion of Nettle extract (NE) as a green corrosion inhibitor. A polyelectrolyte layer of polyaniline (PANI) was employed to loading corrosion inhibitor on the Fe<sub>3</sub>O<sub>4</sub> nanoparticles (Fe<sub>3</sub>O<sub>4</sub>-NP) and preventing the inhibitor release from Fe<sub>3</sub>O<sub>4</sub>-NS before application. Fe<sub>3</sub>O<sub>4</sub>-NS was characterized by different analytical techniques. Results obtained confirmed that the PANI and NE layers were successfully deposited on the Fe<sub>3</sub>O<sub>4</sub>-NP. Electrochemical measurements revealed that Fe<sub>3</sub>O<sub>4</sub>-NS filled with NE is an efficient active corrosion protective system.

**Keywords:** Ultrasound assisted route; Fe<sub>3</sub>O<sub>4</sub> nanoreservoir; Corrosion inhibition, green inhibitor, layer-by-layer assembly, FT-IR; TGA; FE-SEM.

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