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Synthesis and characterization of an advanced layer-by-layer assembled Fe_3O_4/ 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_3O_4 nanoreservoir (Fe_3O_4-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_3O_4 nanoparticles (Fe_3O_4-NP) and preventing the inhibitor release from Fe_3O_4-NS before application. Fe_3O_4-NS was characterized by different analytical techniques. Results obtained confirmed that the PANI and NE layers were successfully deposited on the Fe_3O_4-NP. Electrochemical measurements revealed that Fe_3O_4-NS filled with NE is an efficient active corrosion protective system.

Keywords: Ultrasound assisted route; Fe_3O_4 nanoreservoir; Corrosion inhibition, green inhibitor, layer-by-layer assembly, FT-IR; TGA; FE-SEM.