Abstract No: 78 ***Earth & Environmental Sciences***

GREEN SYNTHESIS OF IRON OXIDE NANOPARTICLES USING NATURAL MAGNETITE, RED EARTH AND POLYPHENOLIC SOLUTIONS EXTRACTED FROM *Camellia sinensis*

T. Wathsala*, N.H. Koralegedara and R. Chandrajith

Department of Geology, Faculty of Science, University of Peradeniya, Sri Lanka
**thilini.wathsala@sci.pdn.ac.lk.*

Using an environmentally friendly approach, this study investigated a method to synthesize iron oxide nanoparticles (IONP) for water remediation. Natural magnetite from an ore deposit in Buttala, Sri Lanka, and red earth from northeastern coastal areas were used as iron precursors. The reducing agent relevant to the synthesis was extracted with 20 g/L tea leaves (*Camellia sinensis*) by heating to 90 °C with deionized water. The finer portion (< 45 µm) of magnetite and red earth were separated, and 5.00 g of each was dissolved in 100 mL of 5.0 M HNO_3. The resulting solutions were added drop wise to the polyphenol solution with stirring at a temperature of 25 °C. The IONP appeared as a black precipitate and the yields were 2.86 g (57.2%) and 3.92 g (78.4%) from magnetite and red earth, respectively. Scanning electron microscopy observations showed that spherical and subspherical IONP aggregates with sizes between 40 and 100 nm. Furrier transformation infrared spectroscopic analysis of IONP confirmed the formation of iron oxides. The peaks at 3192 cm^{-1}, 640 $cm^{-1,}$ and 547 cm^{-1} 403 cm^{-1} correspond to stretching vibrations of α-Fe-O-OH bond, Fe-O, iron and α-Fe_2O_3, respectively. The synthesised nanoparticles rapidly aggregated and formed micromillimeter-sized clusters due to their extreme reactivity. Iron-based nanoparticles are suitable for decontamination of NO_3^-, F^-, and Cl^- in both wastewater and naturally contaminated groundwater. Therefore, this eco-friendly synthesis method would be extremely beneficial as it is a cost-effective, safe, innovative, sustainable and environmentally friendly method.

Keywords: *Camellia sinensis*, Green Synthesis, Magnetite, Nanoparticles, Red Earth