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John Leo Anyik, Oluwatobi S. Oluwafemi

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Plant-mediated synthesis of platinum nanoparticles using water hyacinth as an efficient biomatrix source – An eco-friendly development

John Leo Anyik^{ab} and Oluwatobi. S. Oluwafemi*^{ab}

^aDepartment of Applied Chemistry, University of Johannesburg, P.O. Box 17011, Doornfontein 2028, Johannesburg, South Africa.

^bCentre for Nanomaterials Science Research, University of Johannesburg, Johannesburg, South Africa

*Corresponding author email: oluwafemi.oluwatobi@gmail.com. Tel: +27765110322

Abstract:

We herein report an eco-friendly synthesis of platinum nanoparticles (Pt-NPs) using aqueous extracts from water hyacinth plant as efficient reducing and stabilizing agents. The colour change and optical analysis confirmed the formation of Pt-NPs. Transmission electron microscope (TEM) analysis showed that the as-synthesised Pt-NPs are small and spherical in shape with average diameter of 3.74 nm while dynamic light scattering (DLS) analysis showed hydrodynamic size and zeta potential of 73.3 nm and – 0.0536 mV respectively. Fourier transform infrared spectroscopy (FTIR) indicated that, the presence of hydroxyl, nitrogen and carbohydrate groups present in the extract are responsible for the reduction and capping of Pt-NPs.

Keywords: Green synthesis; platinum nanoparticles; water hyacinth plant; microscopy.

1. Introduction

The ability to manipulate the shape and size of materials at nano-scale has revolutionized the scientific world. Nano-sized materials have distinct physical, chemical, electrical and optical properties which have broadened their applications in various fields like catalysis, electronics, medicine and water purification [1, 2]. Consequently, it has triggered research interest towards the synthesis of noble metal nanoparticles via several chemical and biological methods. Platinum nanoparticles have an exceptional high catalytic activity which has played a key role in the development of fuel cells and in the preparation of organic dyes

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