SIZE TUNABLE GREEN SYNTHESIS OF SILVER NANOPARTICLES USING CELLULOSE EXTRACTED FROM WATER HYACINTH *EICHHORNIA CRASSIPES* AND THEIR CYTOTOXICITY

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ABSTRACT

Eichhornia crassipes commonly known as water hyacinth is a free floating perennial, herbaceous and monocotyledonous macrophyte indigenous to tropical South America. It is also widely distributed in other tropical and subtropical countries. It grows rapidly blocking canals and rivers, obstructing water transport, as well as irrigation and hydropower systems. It reduces biodiversity and provides favourable breading zones to disease-causing vectors. It has a high cellulose content of about 40-60 %.

In an effort to enhance green chemistry practices, we herein report an environmentally benign synthesis of silver nanoparticles in aqueous media using cellulose isolated from water hyacinth as both reducing and capping agent. By varying the pH of the solution and reaction time, control over monodispersity was achieved. The as-synthesized cellulose capped silver nanoparticles (C-AgNPs) were characterized using Fourier transform infrared (FTIR), ultraviolet-visible spectroscopy (UV-Vis), and electron microscopy. A rapid development of brown colour within a few minutes of the reaction at pH 11 confirmed the excellent reducing power of the cellulose towards the silver ions. The maximum surface plasmom resonance (SPR) peak decreased as the pH increased indicating that increase in the pH of the solution favoured the formation of smaller particles. The TEM micrographs showed that the materials are small, highly monodispersed and spherical in shape. The high resolution transmission electron microscope (HRTEM) confirmed the crystallinity of the material while the FTIR spectra confirmed the capping of the AgNPs by the cellulose.

Furthermore, the synthesized cellulose-stabilized silver nanoparticles were evaluated for their cytotoxic properties.

Acknowledgement: We thank the National Research Foundation and the Directorate of Research Development at Walter Sisulu University for their financial support.