

## ABSTRACT

Computed Tomography (CT) Scan is a widely used medical imaging technique in diagnostics, but it has limitations in imaging soft tissues. Iodine-based contrast agents are commonly used to enhance CT-Scan image contrast, but they have several drawbacks, such as potential allergic reactions, nephrotoxicity, and limited circulation time. This study aims to synthesize and characterize platinum nanoparticles in a chitosan solution medium using the pulsed laser ablation method (Nd:YAG). Additionally, this research seeks to obtain CT-Number, SNR, and CNR values to evaluate the capability of platinum nanoparticles as a contrast agent for CT-Scan in vitro. Platinum nanoparticles were synthesized in chitosan solutions with varying concentrations of 0.1%, 0.2%, and 0.3%. Characterization was performed using Transmission Electron Microscopy (TEM), X-Ray Diffraction (XRD), and Ultraviolet-Visible (UV-Vis) Spectrophotometry. The results showed that the synthesis of platinum nanoparticles was most optimal at a chitosan concentration of 0.1%, characterized by a dark brown color. TEM characterization revealed that the formed platinum nanoparticles had a spherical morphology with an average size of  $(1.23 \pm 0.04)$  nm. XRD analysis confirmed a Face-Centered Cubic (FCC) crystal structure without impurities. UV-Vis results indicated a shift in the maximum wavelength and increased absorbance with higher chitosan concentrations. Evaluation of their effectiveness as CT scan contrast agents demonstrated that platinum nanoparticles could enhance *CT-Number*, SNR, and CNR better than iodine. Thus, platinum nanoparticles in a chitosan solution medium synthesized using the pulsed laser ablation method have the potential to be more effective contrast agents for CT scans compared to iodine-based agents.

**Keywords:** platinum nanoparticles, chitosan, pulsed laser ablation, *CT-Scan*, contrast agent, *CT-Number* (HU), *Signal to Noise Ratio (SNR)*, *Contrast to Noise Ratio (CNR)*.