

ABSTRACT

The synthesis of platinum nanoparticles in a 0.2% carboxymethyl cellulose (CMC) medium using the pulsed laser ablation method with an Nd:YAG laser (1064 nm, 80 mJ, 7 ns, 10 Hz) was successfully carried out. Deionized water (DIW) was used as a comparative medium. The 3 hours synthesis process produced colloidal platinum nanoparticles with a spherical shape that were evenly dispersed in the 0.2% CMC medium, while uneven dispersion was observed for the DIW medium. Both colloidal platinum nanoparticles exhibited a dark brown color. The colloidal platinum nanoparticles were then applied as contrast agents for in vitro imaging using computed tomography scan (CT-Scan). The results showed that platinum nanoparticles in the 0.2% CMC medium produced superior CT-Number values across all tested tube voltage variations compared to platinum nanoparticles in the DIW medium and iodine contrast agents. Additionally, contrast to noise ratio (CNR) calculations indicated that platinum nanoparticles in the 0.2% CMC medium exhibited higher CNR values than the DIW medium and iodine contrast agents. Platinum nanoparticles with lower ppm concentrations in both media demonstrated better performance as contrast agents compared to iodine contrast agents, despite iodine having a higher ppm concentration. In conclusion, colloidal platinum nanoparticles, particularly in the 0.2% CMC medium, have significant potential as alternative contrast agents for CT-Scan-based imaging modalities.

Keywords: *Pulsed laser ablation, platinum nanoparticles, carboxymethyl cellulose, CT-Scan contrast agent, CT-Number, contrast to noise ratio.*