

ABSTRACT

Synthesis of tantalum, gold, and tantalum/gold composite nanoparticles with varying compositions of Ta25%:Au75%, Ta50%:Au50%, and Ta75%:Au25% in aquadest medium was successfully carried out using the pulsed laser ablation Nd:YAG method. The synthesis process lasted for 3 hours, followed by a homogenization process using a magnetic stirrer for 1 hour. The resulting tantalum nanoparticles exhibited a cloudy white color, while the gold nanoparticles were reddish-purple. Meanwhile, the composite nanoparticles had a color similar to the gold nanoparticles, but became brighter as the Au content in the colloid decreased. Characterization using UV-Vis, XRD, FTIR, and TEM confirmed the successful formation of the composite nanoparticles, evidenced by the appearance of characteristic features from both materials. These nanoparticle colloids were applied as contrast agents in computed tomography scans and compared to iodine. The results showed that the Ta/Au composite nanoparticles provided the best CT-Number values for all compositional variations, namely Ta25%:Au75%, Ta50%:Au50%, and Ta75%:Au25%, followed by gold nanoparticles, tantalum nanoparticles, and finally iodine at various voltage variations. Similar results were also obtained through CNR calculations, where the Ta25%:Au75% composite nanoparticles had the best value. Thus, Ta/Au composite nanoparticles, especially with a Ta25%:Au75% composition, have significant potential as an alternative contrast agent for CT-based imaging.

Keywords: *Tantalum nanoparticles, gold nanoparticles, pulsed laser ablation, CT-Scan contrast agents, CT-Number, contrast to noise ratio.*