

Thesis Title	Green Synthesis of Silver Nanoparticles by Light Irradiation of Durian Rind Extract and AgNO_3
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Abstract

The objective of this research was to green synthesize silver nanoparticles (AgNPs) using Mon Thong durian (*Durio zibethinus* L.) rind extract as a reducing agent (reduced Ag^+ dissolved in AgNO_3 solution to AgNPs) as well as stabilizer under irradiation of light. In the experiment, effects of 1) outer and inner shells of durian rind extracts, 2) light intensities (2,810, 8,120 and 13,430 lux), 3) pH values of solution (4.5, 6.5, 7.5, 8.5 and 12.0), and 4) the reaction times (5, 10, 30 min, 1, 2, 3, 6, 9 and 12 h) on particle size, shape, and amount of synthesized AgNPs were investigated. The components and functional groups of organic compound in the durian rinds, absorption spectra of AgNPs colloid, particle size and shape, crystalline structure, and amount of AgNPs were characterized using high performance liquid chromatography (HPLC), Fourier transform infrared spectroscopy (FT-IR), UV-visible spectroscopy, transmission electron microscopy (TEM), X-ray diffraction (XRD) spectrometry, and inductively coupled plasma-atomic emission spectroscopy (ICP-AES), respectively. The results showed that durian rind extract can be used for synthesis of the AgNPs. The appearance of a yellowish-brown color due to the surface plasmon resonance in mixture of AgNO_3 solution and durian rind extract was the indication of AgNPs formation. Durian rind extract reduces Ag^+ ion to Ag^0 (AgNPs) because a numerous amounts of hydroxyl group of glucose and fructose performs as a reducing agent, and starch or protein as a stabilizer. Using inner shell of durian rind extract under higher light intensity, the rate of AgNPs formation increased. The alkaline pH also enhanced the formation of AgNPs. Large size of nanoparticles was formed at low pH, whereas small size and highly dispersed nanoparticles were formed at high pH. Furthermore,

size distribution decreased with increasing pH solution. The suitable pH condition obtained from the method proposed here was 8.5. The synthesized AgNPs were mainly spherical shape and exhibited a relatively narrow size distribution with an average particle diameter of 11.411 ± 3.200 nm. The crystalline structure of AgNPs was found to be fcc (face-centered cubic) phase. The yield of synthesized AgNPs was calculated to be 98.56 % by ICP-AES.

Keywords : *Durio zibethinus* L. / Green Synthesis / Silver Nanoparticles / Surface Plasmon

Resonance