Green synthesis of silver nanoparticles: utilizing *Garcinia cowa* leaf extract and their antimicrobial potentials

Duangkamon Maleehuan, Chantha Kaeosaingoen, Amornrassamee Jinnarak*

*Department of Chemistry, Faculty of Science and Technology, Rajabhat Rajanagarindra University, Mueang Chachoengsao, Chachoengsao 24000, Thailand*

*E-mail: amornrassamee@gmail.com*

**Abstract:** A green synthesis of nanoparticle is one step towards fulfilling the critical need for sustainable and ecofriendly environment. The present paper reports a simple, effective and ecofriendly synthesis approach for producing more stable silver nanoparticles (AgNPs) at room temperature that uses an aqueous leaf extract of *Garcinia cowa*. The synthesis procedure was adding 2 mL of the leaf extract into 10 ml of 0.01 M aqueous silver nitrate solution and stirred gently for 30 minutes then incubating for 72 hours. The color of the reaction mixture changed from light red wine to reddish brown which confirmed a successful biosynthesis of AgNPs. The biosynthesis was monitored by UV–vis spectroscopy that tracked absorption of a sharp surface plasmon resonance at 448 nm. The AgNPs were characterized by Fourier transformed infrared spectroscopy, X-ray diffraction spectroscopy, dynamic light scattering, zeta potential, scanning electron microscopy, energy dispersive spectroscopy and transmission electron spectroscopy. The average particles size of 30 nm. The AgNPs showed high antimicrobial activity against gram-positive (*Bacillus subtilis*, *Micrococcus luteus* and *Staphylococcus aureus*) and gram-negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*).

**Keywords:** *Garcinia cowa*; Green synthesis; Silver nanoparticles; Antimicrobial; Characterization