

Research Article

Benjaporn Noppradit, Setsiri Chaiyosburana, Nutthaphol Khupsathianwong, Weena Aemaeg Tapachai, Yupa Wattanakanjana, and Apichat Phengdaam*

Green synthesis of silver nanoparticles using *Saccharum officinarum* leaf extract for antiviral paint

Supplementary material

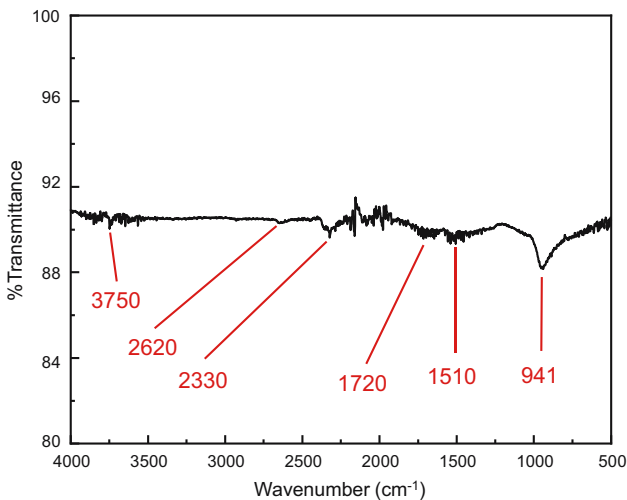


Figure S1: ATR FT-IR spectra illustrating the green-synthesized AgNPs under varying pH conditions, specifically at pH 10.

* Corresponding author: Apichat Phengdaam, Division of Physical Science, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand, e-mail: apichat.p@psu.ac.th
Benjaporn Noppradit: Department of Pharmacognosy and Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand
Setsiri Chaiyosburana: NIST International School, 36 Sukhumvit Soi 15, Klongtoey-nua, Wattana, Bangkok 10110, Thailand
Nutthaphol Khupsathianwong: Technopreneurship and Innovation Management Program, Graduate School, Chulalongkorn University, Bangkok 10330, Thailand
Weena Aemaeg Tapachai, Yupa Wattanakanjana: Division of Physical Science, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand

Table S1: Assignment of characteristic bands through ATR FT-IR spectroscopy based on the spectra presented in Figure S1

Peak position observed (cm ⁻¹)	Peak position standard (cm ⁻¹)	Assignment	*Ref
3,750	3,400–3,700	Alcohol (O–H)	[1]
2,620	2,920–2,856	Methyl (CH ₃)	[1]
2,330	2,100–2,250	Alkene (CC)	[2]
1,720	1,650–2,000	Aromatics (C=O)	[1]
1,510	1,636	COO–	[1]
941	1,076	Amine and hydroxyl groups	[3]

Table S2: Efficacy of AgNPs on growth inhibition of *S. aureus*

Samples	Growth of bacteria*					
	Concentration of sample (ppm)					
	40	20	10	5	2.5	1.25
Negative control (Media + Bacteria)				+		
Positive control (Media + AgNPs)	–	–	–	–	–	–
AgNPs	–	–	+	+	+	+

*1: Symbol – = Not growth, 2: Symbol + = Growth, and 3: Repeat 4 experiments.

Table S3: Efficacy of AgNPs on growth inhibition of *E. coli*

Samples	Growth of bacteria*					
	Concentration of sample (ppm)					
	40	20	10	5	2.5	1.25
Negative control (Media + Bacteria)				+		
Positive control (Media + AgNPs)	–	–	–	–	–	–
AgNPs	–	–	–	–	–	+

*1: Symbol – = Not growth, 2: Symbol + = Growth, and 3: Repeat 4 experiments.

Table S4: The color space coordinates in the International Commission on Illumination (CIE) system for various concentrations of AgNPs blended in paint, ranging from 0 to 120 ppm

The CIELAB	AgNPs blending in paint (ppm)				
	0	60	80	100	120
<i>L</i>	97.46	96.25	95.15	93.4	93.4
<i>a</i> *	–0.52	–0.34	–0.09	0.25	0.25
<i>b</i> *	1.15	1.21	1.26	1.31	1.37

Table S5: The average number of infectious units per square centimeter (cm²) retrieved from both the test and reference control materials after a 24-hour contact period with the Human Coronavirus NL63

Test condition	Virus recovery control (TCID50/cm ²)	Antiviral test (TCID50/cm ²)	TCID50 (log10)	<i>R</i> Value	% reduction
Test	NA*	$2.96 \times 10^1 \pm 0.00 \times 10$	1.47	1.55	>90%
Reference	$2.96 \times 10^3 \pm 0.00 \times 10$	$1.04 \times 10^3 \pm 3.34 \times 10^2$	3.02		

*NA: not available.

References

- [1] Palencia M, Córdoba A, Rivas BL. Concentration–polarization effect of poly (sodium styrene sulfonate) on size distribution of colloidal silver nanoparticles during diafiltration experiments. *Colloid Polym Sci.* 2014;292:619–26.
- [2] Majumder S, Bhuiyan AH. DC conduction mechanism in plasma polymerized vinylene carbonate thin films prepared by glow discharge technique. *Polym Sci Ser A.* 2011;53:85–91.
- [3] Chandra A, Singh M. Biosynthesis of amino acid functionalized silver nanoparticles for potential catalytic and oxygen sensing applications. *Inorg Chem Front.* 2018;5(1):233–57.