Supplementary Information

Attracted-Killed Inhibition Mechanism in Ag/Chitosan Hydrogel for Long-Acting Control of *Ralstonia solanacearum*

Yi-Hsin Chien[a*], Bo-Yan Lin[a], Han-Hsiang Shih[a], Chun-Yu Chen[a], and Peng-Chieh Chen[a]

[a] Department of Materials Science and Engineering, Feng Chia University, Taichung, Taiwan
*Corresponding author e-mail: yhchien@fcu.edu.tw

Table S1. The summarized antimicrobial table includes antimicrobial materials, bacteria, monitoring methods, and antibacterial activity.

Type of antimicrobial materials	Test bacterial	Method	Antibacterial activity	Reference
TiO_2	*E.coli*	Turbidity method	2.65×10^6 UFC/mL	1
TiO_2	*E.coli* and *S.aureus*	Disk diffusion	17.2mm和14.3mm	2
MgO	*E.coli* and *S.aureus*	Disk diffusion	12.7mm / 9.3mm (10^4 CFU/mL^{-1})	3
Fe	*E.Coli / S.aureus / P. aeruginosa*	Disk diffusion	27mm / 30mm /29mm	4
FeO_3	*Klebsiella pneumonia* and *Staphylococcus aureus*	Disk diffusion	42 和 47 mm (2.65×10^6 UFC/mL)	5
Al_2O_3	*S.Pyogenes* and *P.vulgaris*	Disk diffusion	2.65×10^6 UFC/mL	6
Ag	*E.coli* and *S.aureus*	Disk diffusion	9 mm / 9 mm	7
Ag	*E.coli* and *S.aureus*	Turbidity method and Disk diffusion	2.65×10^8 UFC/mL	8
ZnO	*E.coli*	Agar dilution method	2.28×10^8 UFC/mL	9
ZnO	*L. monocytogenes* and *E.coli*	Spread plate method	1×10^8 CFU/mL	10
CuO	*P. aeruginosa, B. circulens, E.coli* and *S.sureus*	Turbidity method	10^7 UFC/mL	11
CuO and ZnO	*P. aeruginosa, S. aureus* and *E.coli*	Disk diffusion	10^7 UFC/mL	12
Cs/PVP	*E.coli* and *S. aureus*	Disk diffusion	25.53mm和15.40mm	13
Ag/CaO	*S. aureus*	Plate Count Agar	1×10^6	14
Ag@Cs/Cs^h hydrogel	***R. solanacearum***	**Turbidity method**	**$5x10^8$ CFU/mL**	**This study**

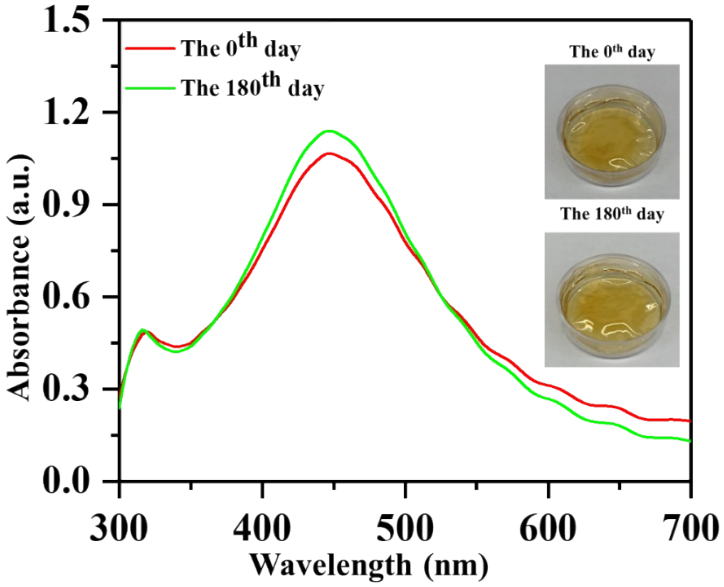
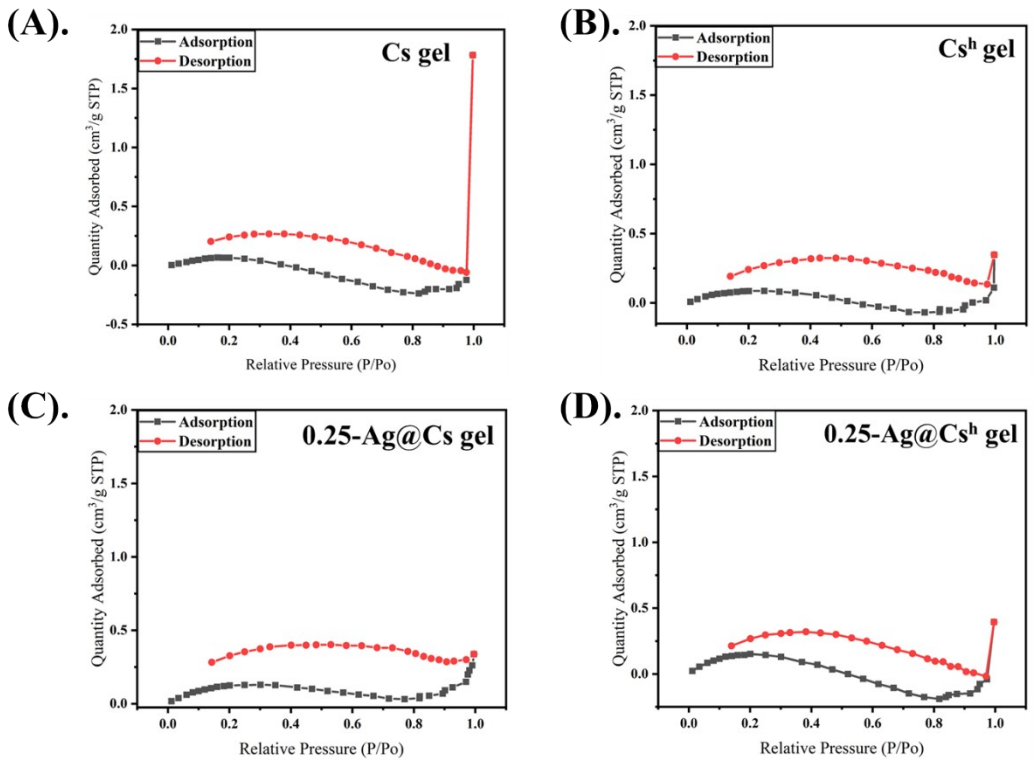


Figure S1. The stability test of 0.25-Ag@Cs gel through the optical property and morphology at the 180th using UV-Vis spectrum and photograph (insert).



(E).

Samples	Cs gel	Cs^h gel	0.25-Ag@Cs gel	0.25-Ag@Cs^h gel
Surface Area (m^2/g)	0.5915	0.3722	0.5823	0.0165
Pore Volume (cm^3/g)	0.000075	0.000170	0.000308	0.000203
Pore Size (Å)	5.0594	18.2191	21.1768	X

Figure S2. The N_2 adsorption/desorption isotherms of BET assay: (A). Cs gel; (B). Cs^h gel; (C). 0.25-A@Cs gel; and (D) 0.25-A@Cs^h gel. The BET profile, including surface area, pore volume, and pore size, is shown in (E).

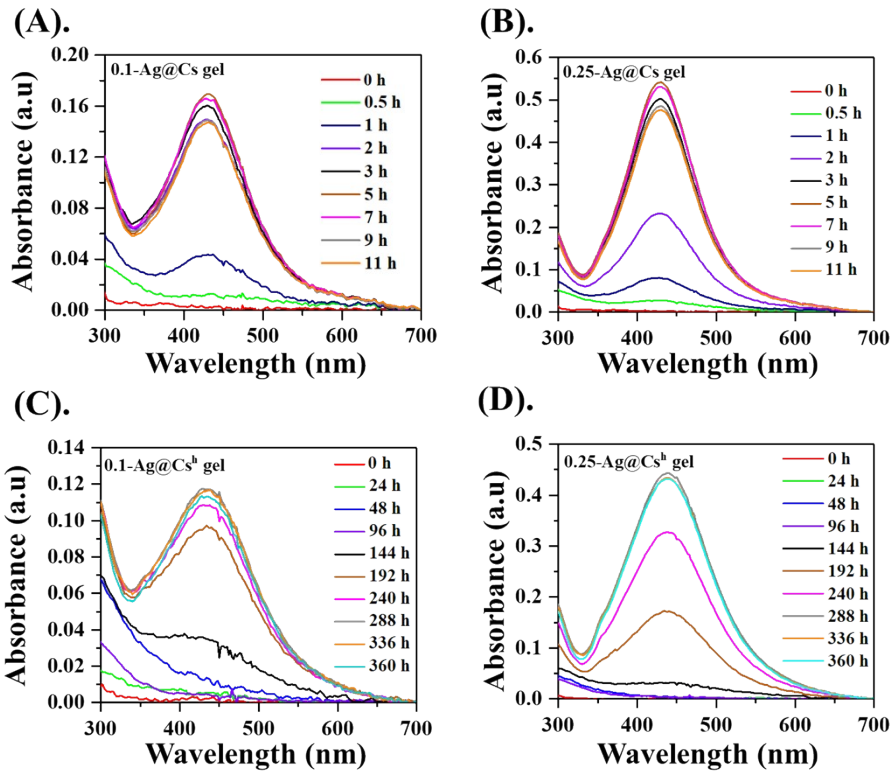


Figure S3. The absorbance peak at 434 nm was monitored by UV-Vis spectrum corresponding to the amount of Ag NPs released during water-soaking conditions: (A) 0.1-Ag@Cs gel; (B) 0.25-Ag@Cs gel; (C) 0.1-Ag@Cs^{h} gel; (D) 0.25-Ag@Cs^{h} gel.

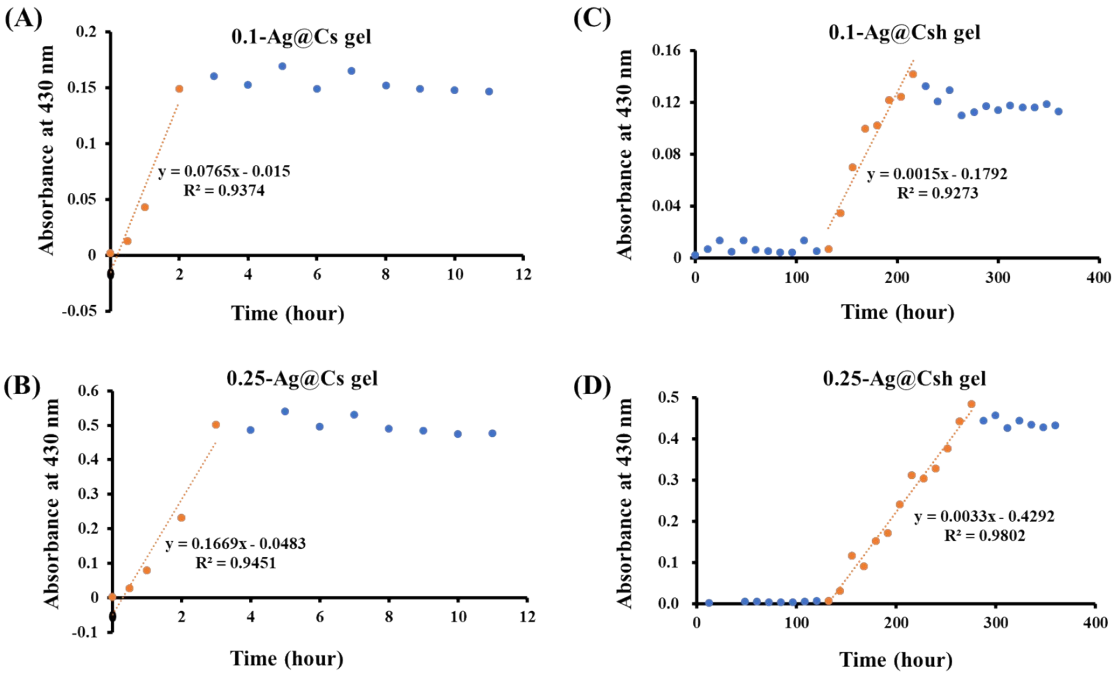


Figure S4. Ag NPs released versus time profile of Zero-order model in the partial time zone, indicating the absorption phase and elimination phase: (A) 0.1-Ag@Cs gel; (B) 0.25-Ag@Cs gel; (C) 0.1-Ag@Cs^{h} gel; (D) 0.25-Ag@Cs^{h} gel.

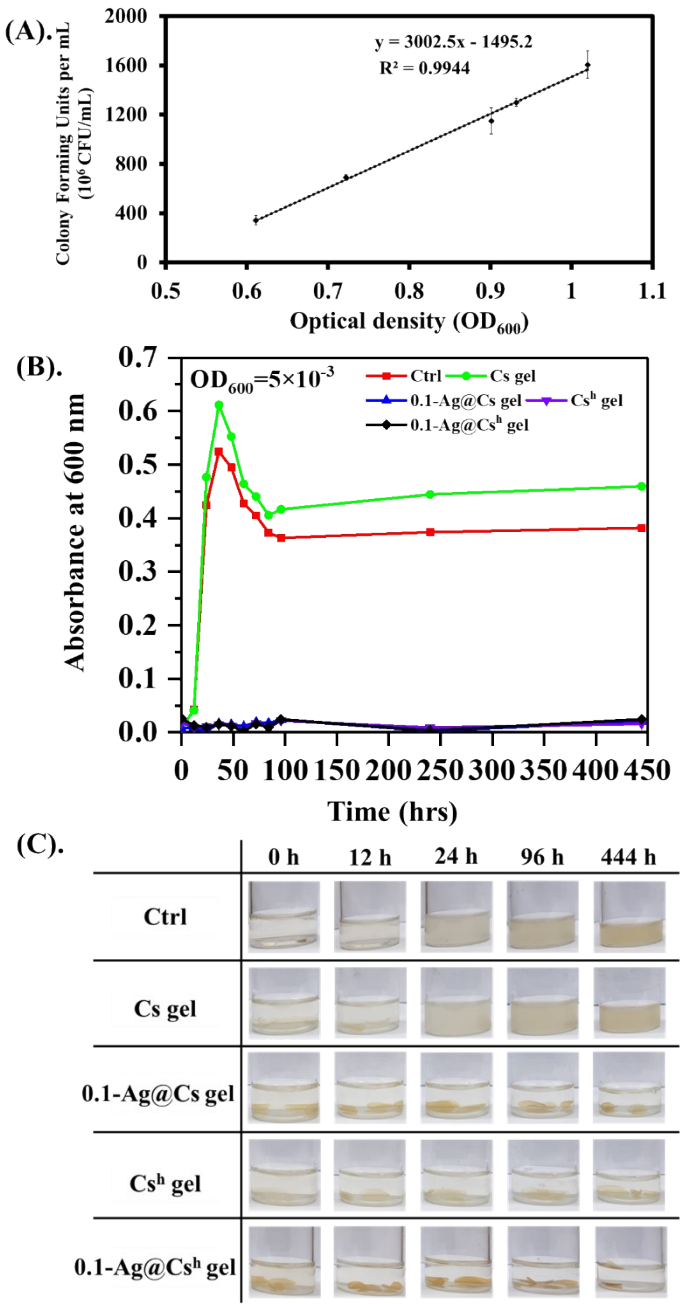


Figure S5. (A). The linear curve of *R. solanacearum* from 3.2x10^8 CFU/mL to 1.6x10^9 CFU/mL. Investigating sterilization ability in *R. solanacearum* concentration of 5x10^6 CFU/mL with Cs/Cs^h gel and 0.1/Ag@Cs/Cs^h gel under 30 °C and 200 rpm incubator. (B). The intensity of $OD_{600\ nm}$ was monitored using the UV-Vis spectrum; (C). The medium in the sample vials was observed to become turbid, indicating bacteria growth, as seen in the photographs of each condition.

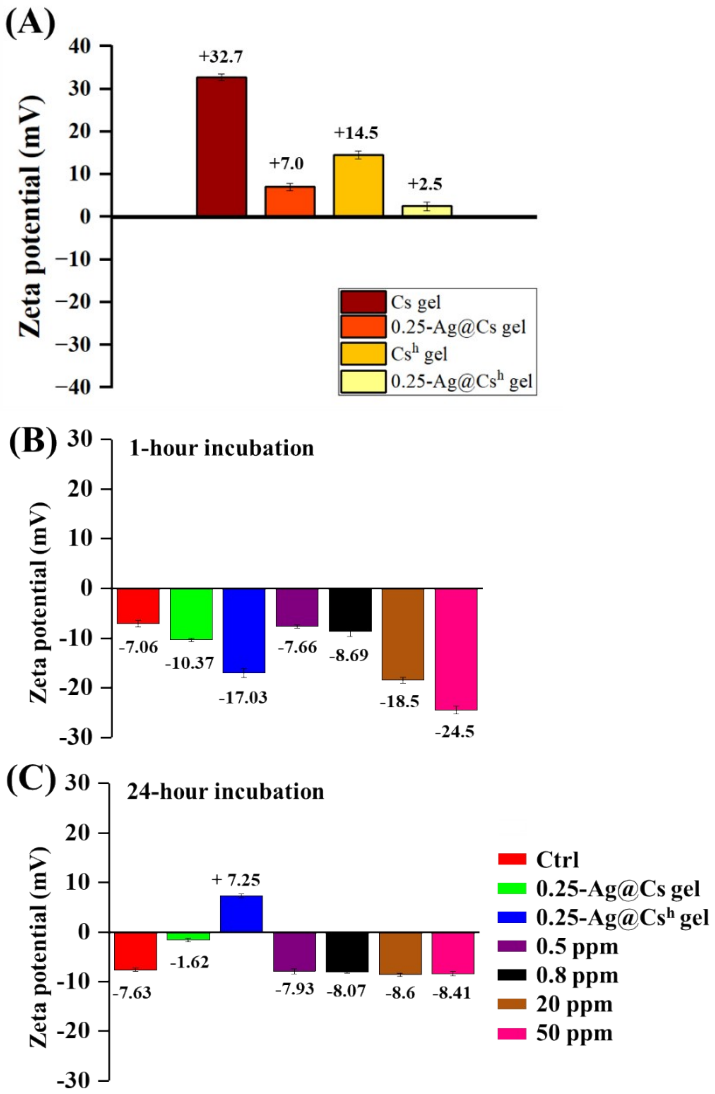


Figure S6. (A) The zeta potential profiles of Cs/Cs^h gel and 0.25-Ag@ Cs/Cs^h gel in aqueous solution. The zeta potential profiles of Ctrl (*R. solanacearum*), 0.25-Ag@Cs/Cs^h gel, 0.5, 0.8, 20, and 50 ppm were incubated with 5x10^8 CFU/mL *R. solanacearum* for (B) 1-hour; (C) 24-hour incubation.

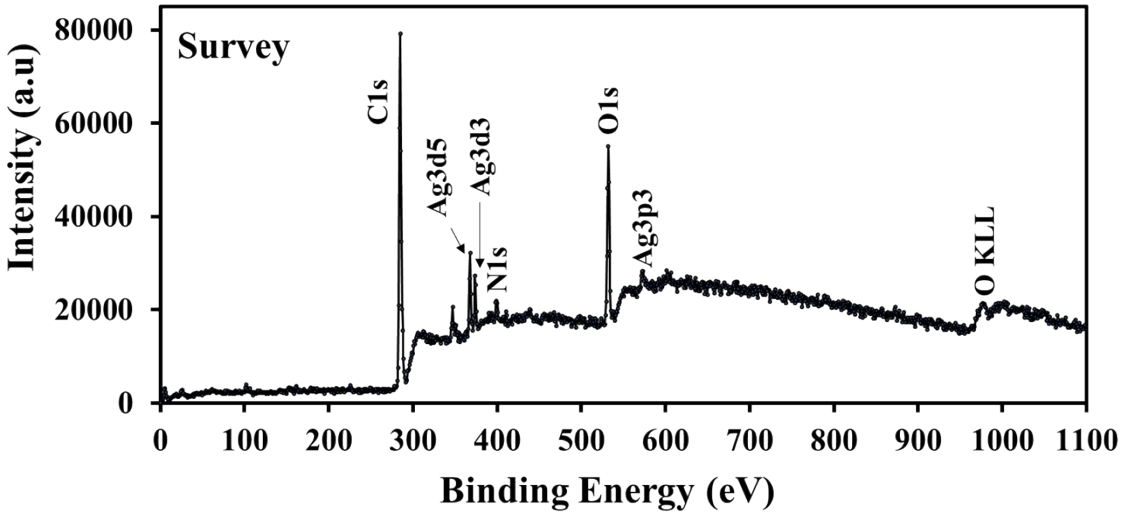


Figure S7. The XPS profiles of 0.25-Ag@Cs gel presented a full survey scan spectrum.

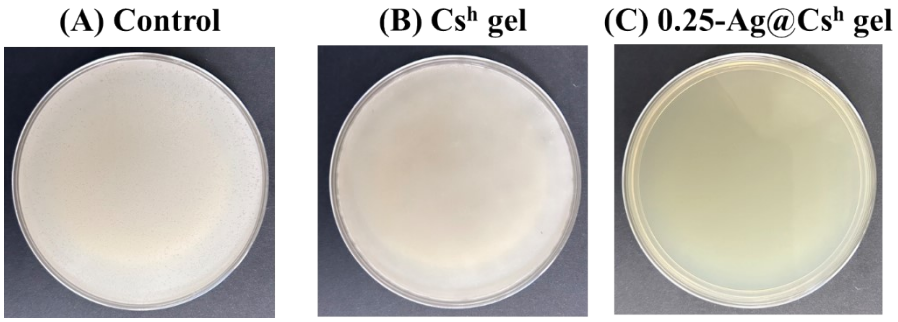


Figure S8. (A) The *R. solanacearum* concentration is 5 x 10^8 CFU/mL as control; culture the sterilized *R. solanacearum* on agar plates: (B) Transferred 100 µL of the solution from the Cs^h gel mixture and (C) Transferred 100 µL of the transparent solution from the 0.25-Ag@Cs^h gel mixture for an additional 24 hours of culture under incubator at 30 ℃.

Reference

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