Supplementary Material (ESI) for Journal of Materials Chemistry

Electronic Supplementary Information

Hydroxyapatite supported antibacterial Ag_3PO_4 nanoparticles

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Porosimetry

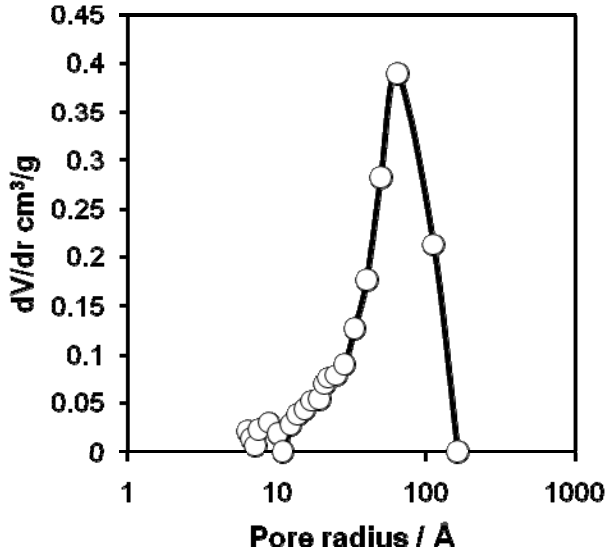

Figure S1: Pore size distribution for HA-H support.

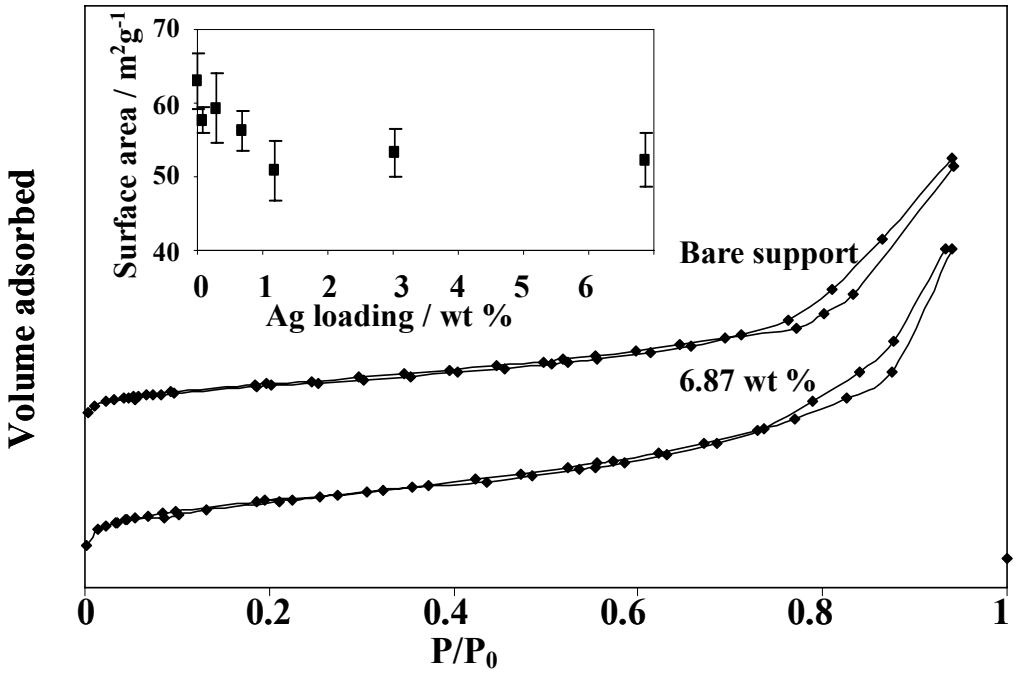

Figure S2a. Adsorption and desorption isotherms for high and low loading Ag-HA-L sample. Inset shows BET surface areas across series.

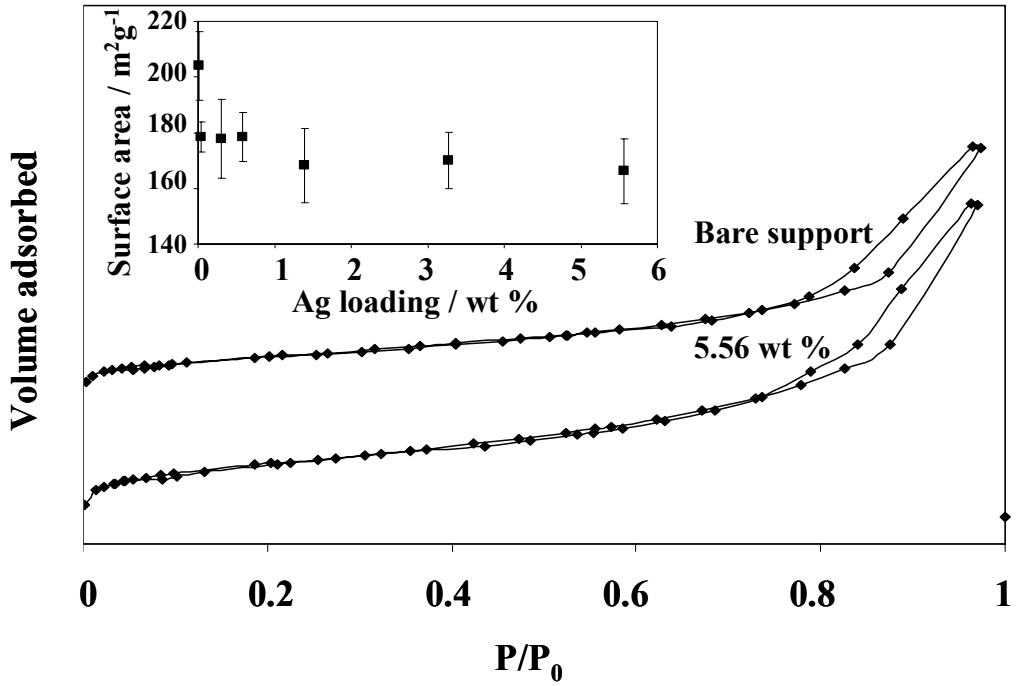

Figure S2b. Adsorption and desorption isotherms for high and low loading Ag-HA-H sample. Inset shows BET surface areas across series.

Powder X-ray Diffraction (XRD)

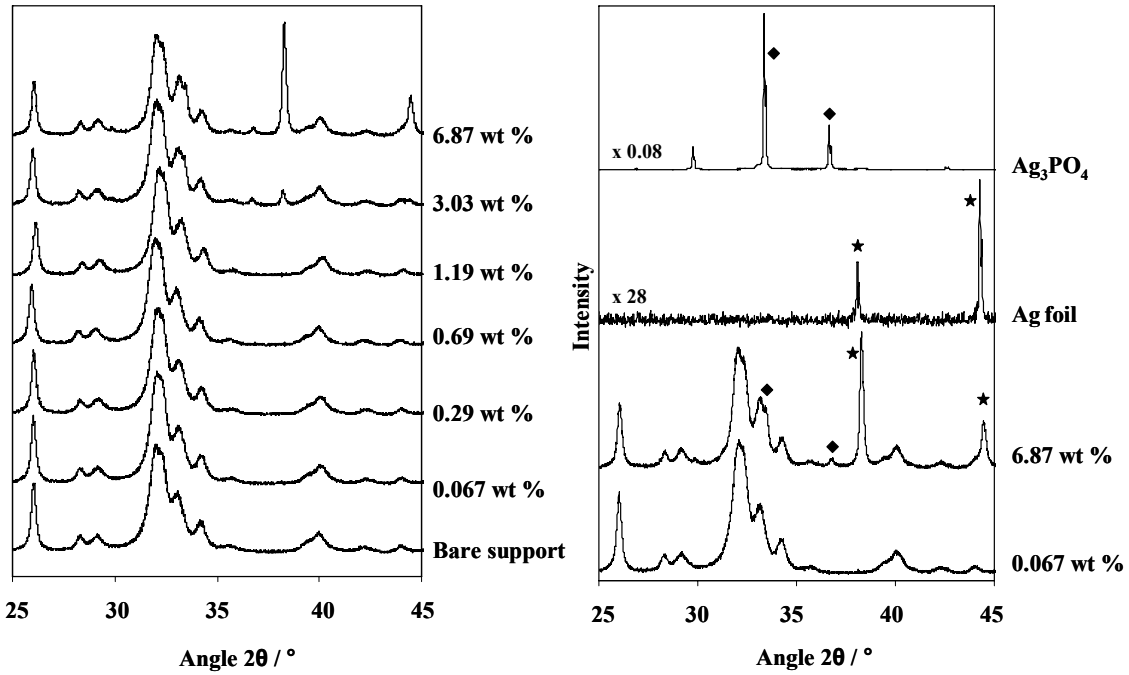

Figure S3a. Wide angle powder XRD scans of Ag-HA-L samples (left) and silver standards (right)

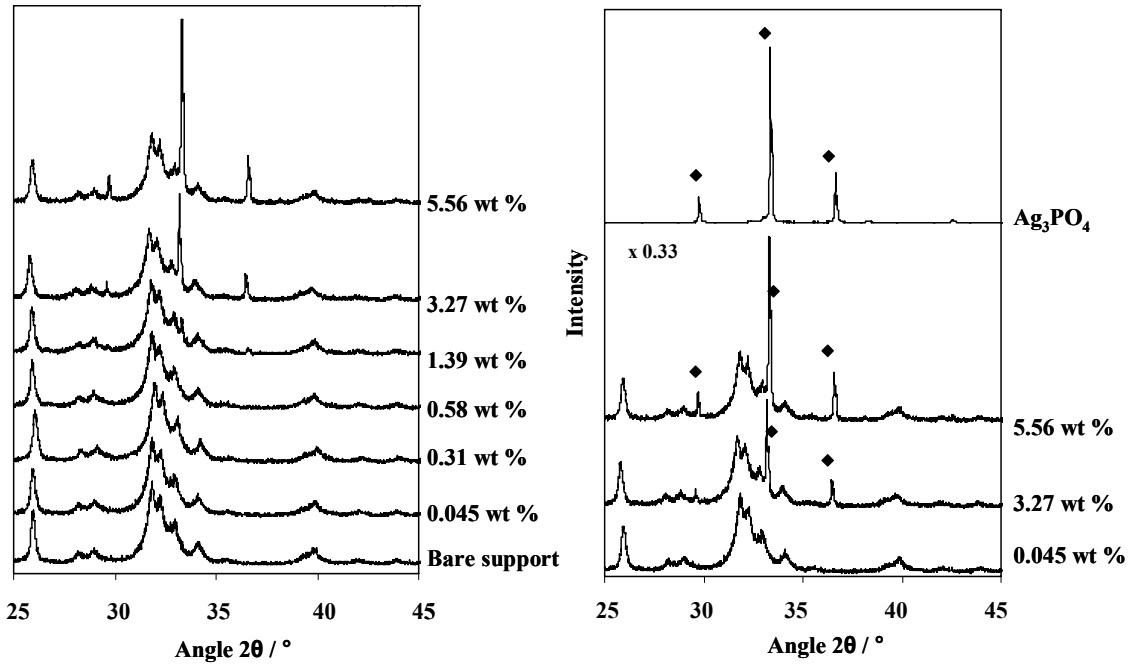

Figure S3b. Wide angle powder XRD scans of Ag-HA-H samples (left) and silver standards (right)

X-ray Photoelectron Spectroscopy (XPS)

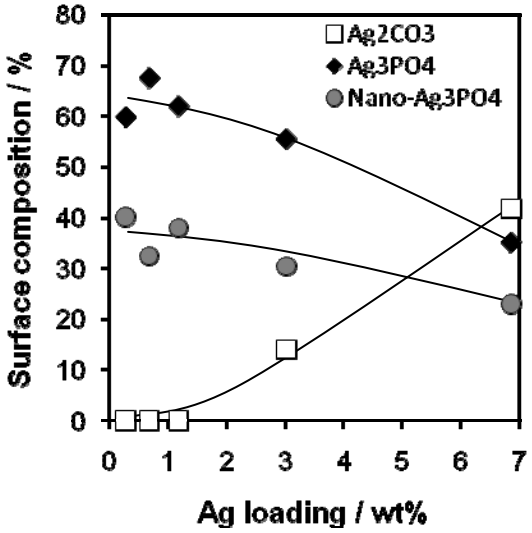

Figure S4. Ag 3d of Ag-HA-L

X-ray Absorption Near Edge Spectroscopy (XANES)

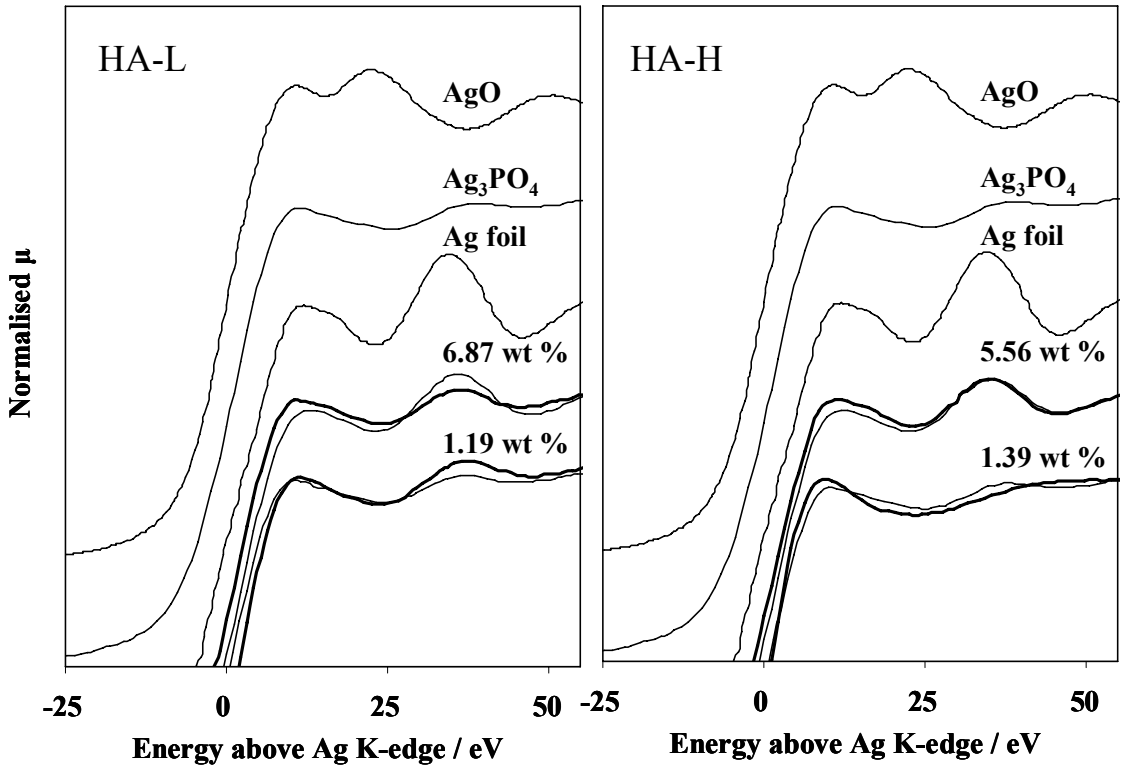

Figure S5: Normalised Ag-K edge XANES spectra for Ag-HA-L (left) and Ag-HA-H (right) samples showing linear combination fits (dark line) to silver standards

Extended X-ray Absorption Fine Structure Spectroscopy (EXAFS)

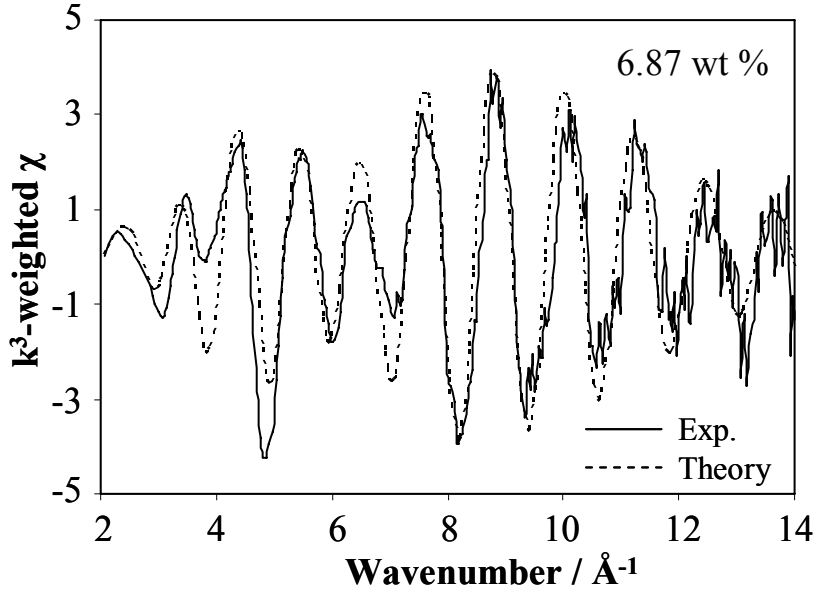

Figure S6a. k^3-weighted EXAFS of 6.87 wt % Ag-HA-L

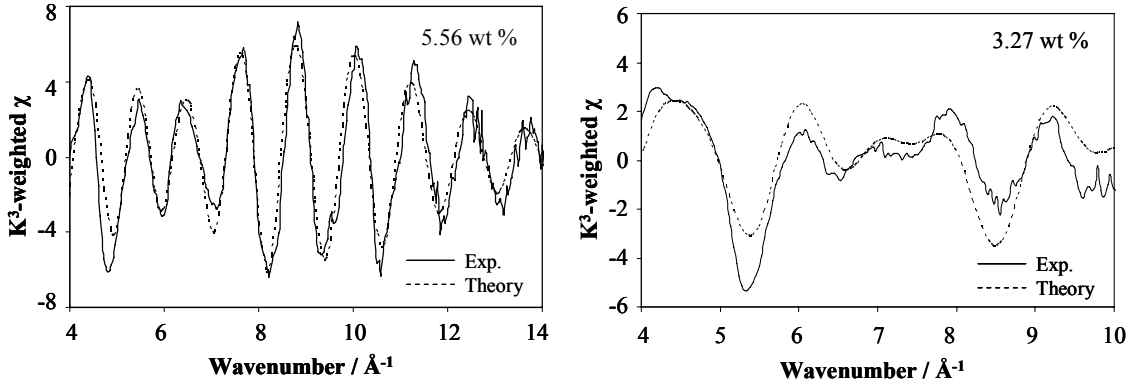

Figure S6b. k^3-weighted EXAFS of 5.56 wt % and 3.27 wt% Ag-HA-H

Table S1. Fitted EXAFS parameters for high loading Ag-HA samples

Sample	CN1 $_{Ag-Ag}$	CN2 $_{Ag-Ag}$	R1 $_{Ag-Ag}$	R2 $_{Ag-Ag}$	σ1 $_{Ag-Ag}$	σ1 $_{Ag-Ag}$	R-factor
6.87 wt % Ag-HA-L	9.1	3	2.88	4.07	0.02	0.04	54.7
5.56 wt % Ag-HA-H	9	2.9	2.88	4.06	0.02	0.02	34.0

Table S2. Fitted EXAFS parameters for 3.27 wt% Ag-HA-H sample

$CN1_{Ag-P}$	$CN2_{Ag-O}$	$CN3_{Ag-Ag}$	$CN4_{Ag-O}$	$CN5_{Ag-Ag}$	$R1_{Ag-P}$	$R2_{Ag-O}$	$R3_{Ag-Ag}$	$R4_{Ag-O}$	$R5_{Ag-Ag}$	$\sigma1_{Ag-P}$	$\sigma2_{Ag-O}$	$\sigma3_{Ag-Ag}$	$\sigma4_{Ag-O}$	$\sigma5_{Ag-Ag}$	R-factor
1	2	6	2	4	1.32	1.41	2.13	2.72	3.00	0.02	0.04	0.04	0.033	0.025	80.3

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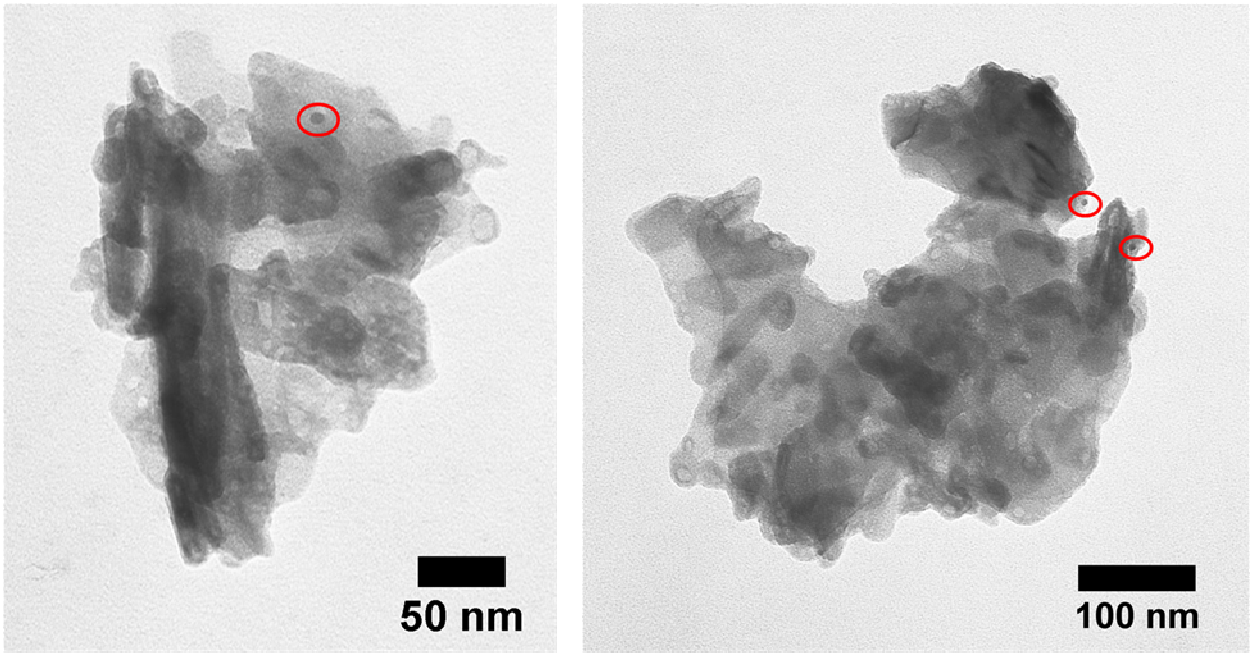
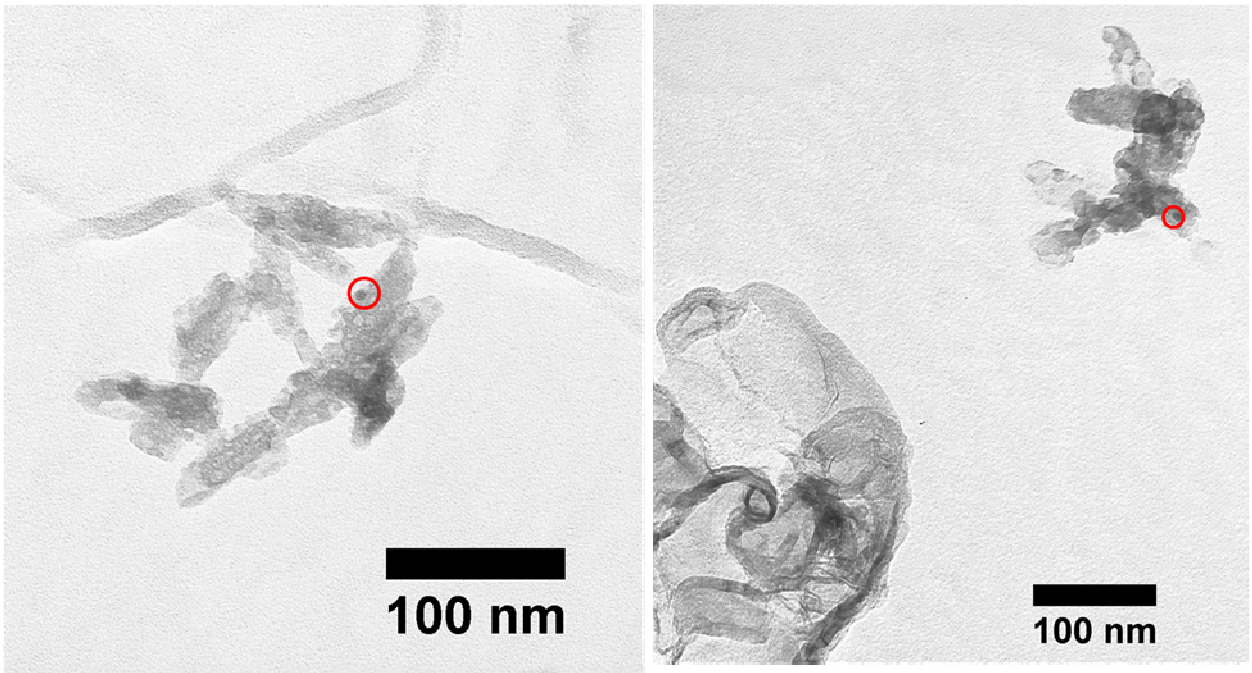
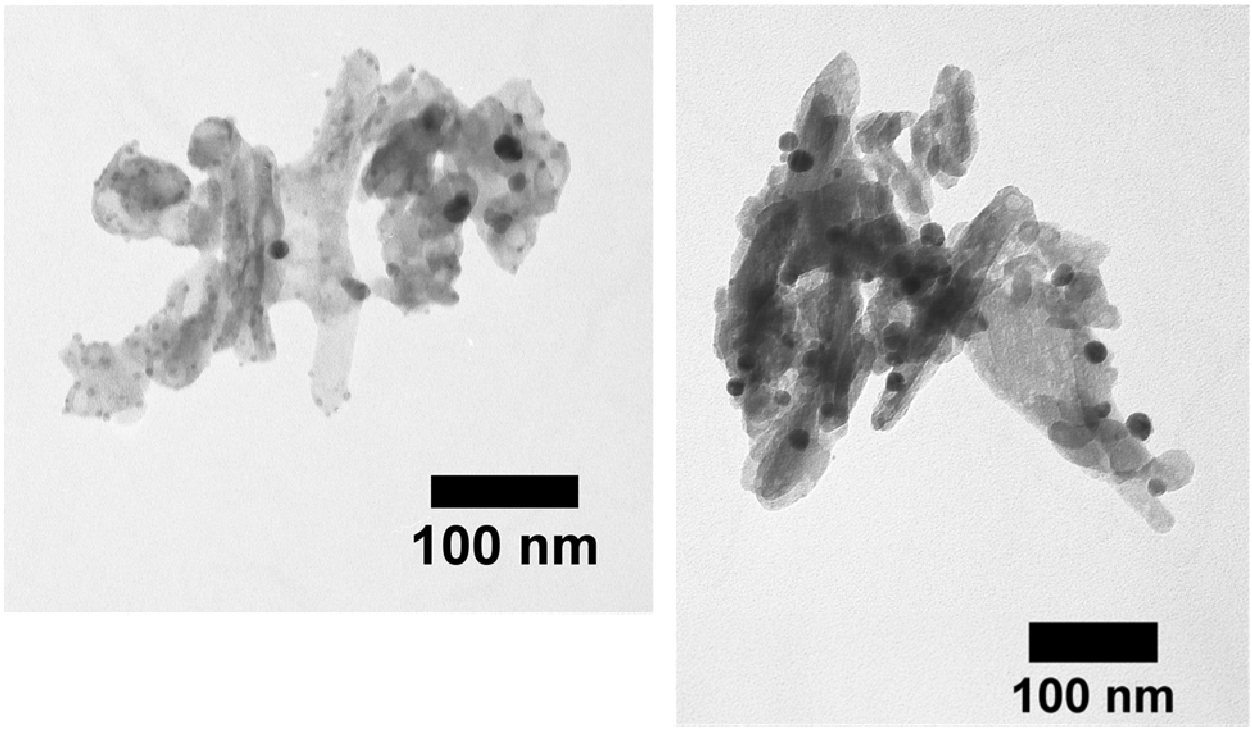
Transmission Electron Microscopy (TEM)



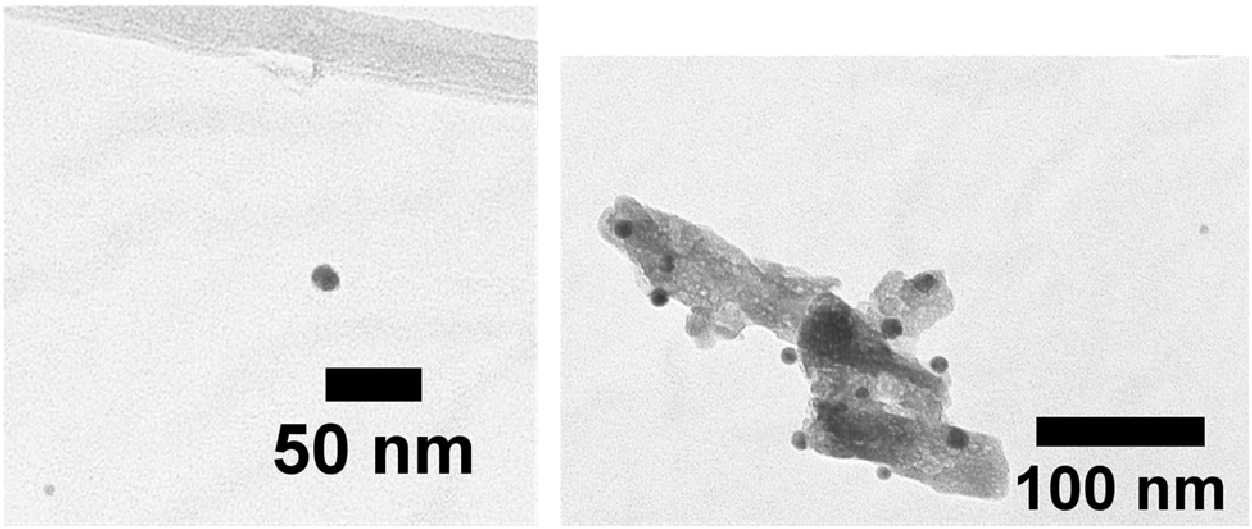
0.29 wt% Ag-HA-L



0.31 wt% Ag-HA-H



6.87 wt% Ag-HA-L



5.56 wt% Ag-HA-H

Dissolution profiles

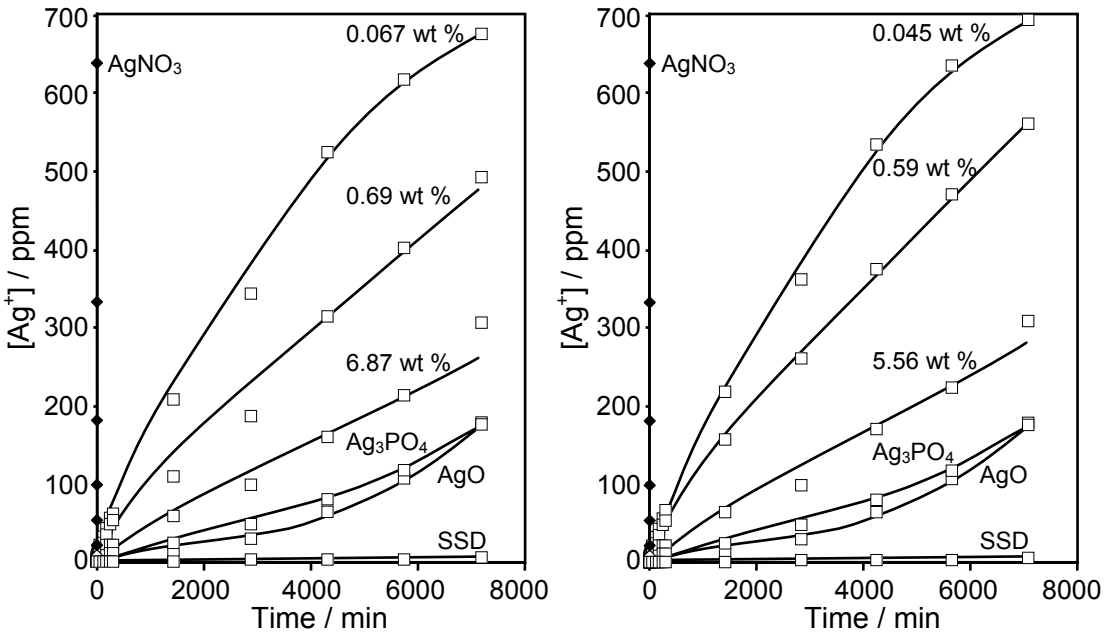


Figure S7. Normalised concentration of leached silver from representative low, medium and high loading Ag-HA-L (left) and Ag-HA-H (right) samples

Table 3. Ag^+ dissolution rates for standards and Ag-HA-L samples in water

Sample	**Rate constant/ ppm min^{-1} (± 0.05)**
Ag_3PO_4	0.028
AgO	0.0080
SSD	0.00040
0.067 wt %	1.33
0.29 wt %	1.24
0.69 wt %	0.97
1.19 wt %	0.67
3.03 wt %	0.38
6.87 wt %	0.063

Table 4 Ag^+ dissolution rates for standards and Ag-HA-H samples in water

Sample	**Rate constant/ ppm min^{-1} (± 0.05)**
Ag_3PO_4	0.028
AgO	0.0080
SSD	0.00040
0.045 wt %	1.37
0.31 wt %	1.26
0.59 wt %	1.17
1.39 wt %	1.02
3.27 wt %	0.59
5.56 wt %	0.093

Zones of Inhibition

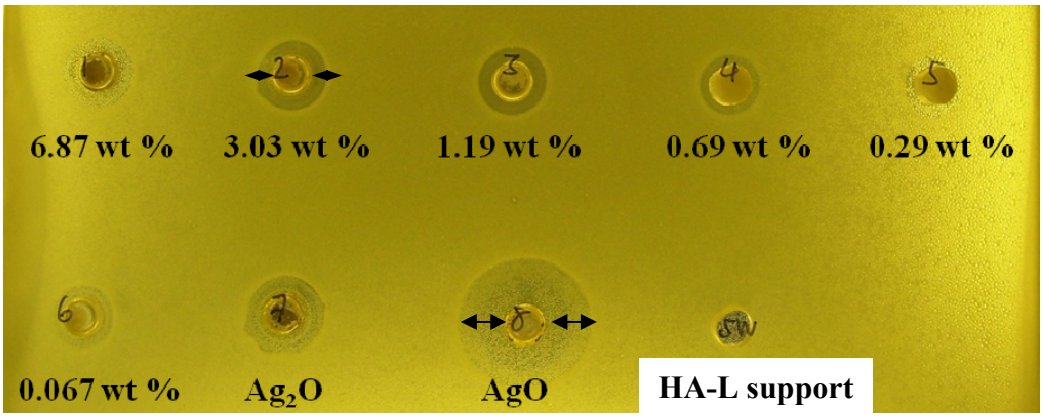


Figure S8a. Zones of inhibition of Ag-HA-L for *P* *ginosa* 8626 NCIMB

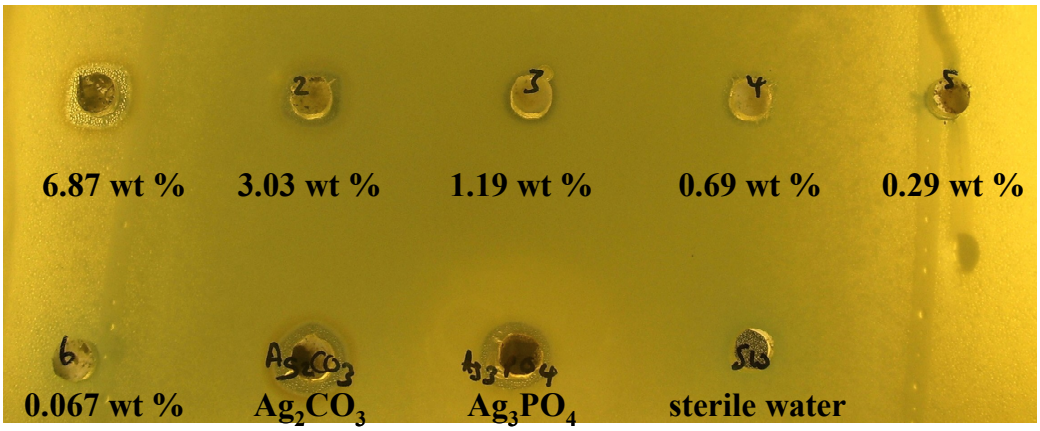


Figure S8b. Zones of inhibition of Ag-HA-L for *Staphylococcus aureus 10788 NCTC*

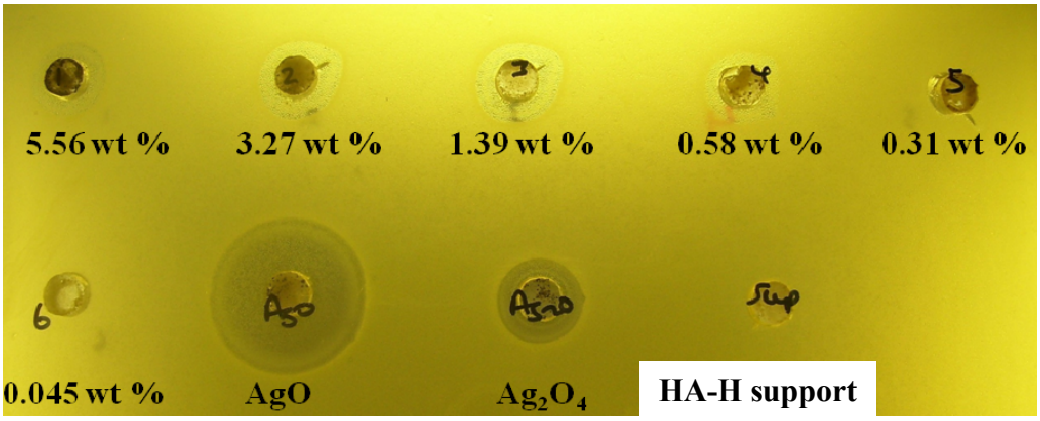


Figure S8c. Zones of inhibition of Ag-HA-H for *P* *ginosa* 8626 NCIMB

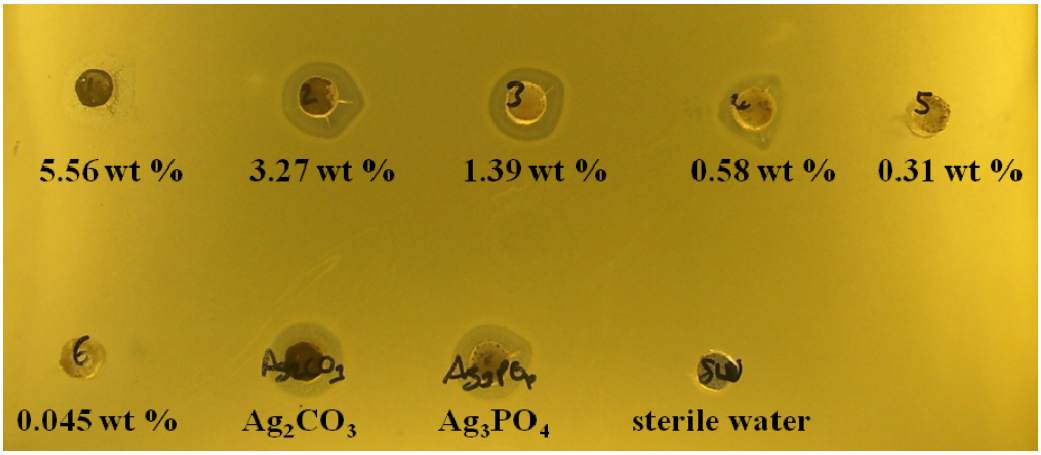


Figure S8d. Zones of inhibition of Ag-HA-H for *Staphylococcus aureus 10788 NCTC*
Log reduction kill tests

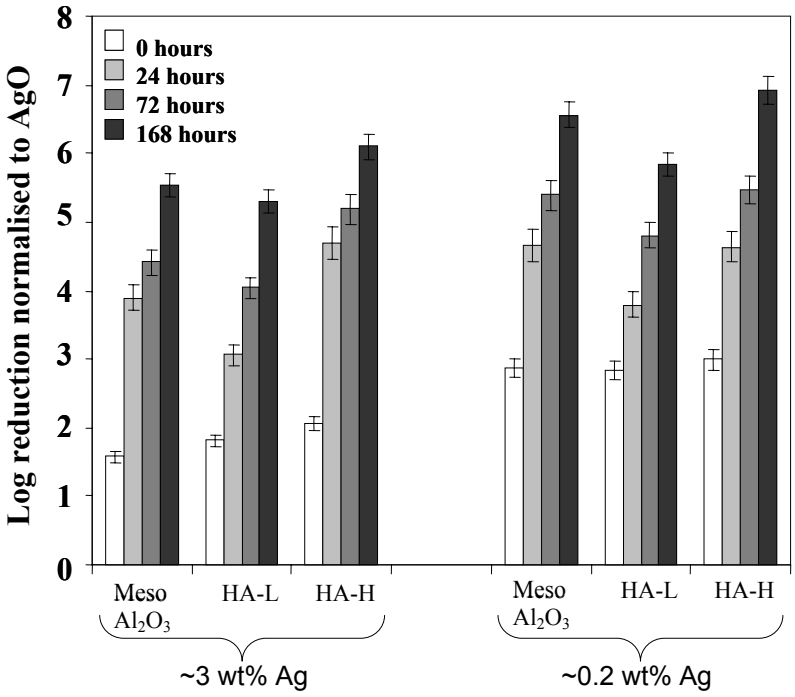


Figure S9. Comparison of normalised bacteria kill tests for *S. aureus* using ~3 wt % and ~0.2 wt % Ag loaded mesoporous Al_2O_3 versus HA-L or HA-H

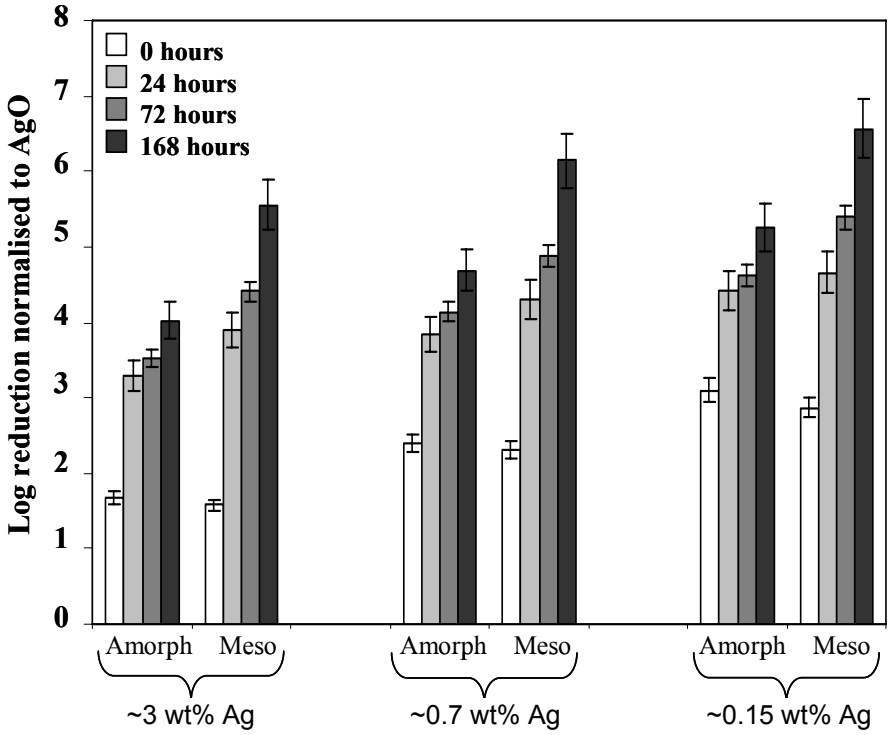


Figure S10. Comparison of normalised bacteria kill tests for *S. aureus* using ~3 wt % and ~0.15 wt % Ag loaded low are amorphous versus high area mesoporous Al_2O_3