Supplementary Information (SI) for Nanoscale.

Supplementary Information

Laser-induced optical and structural modification in AgI thin films loaded by silver nanoparticles

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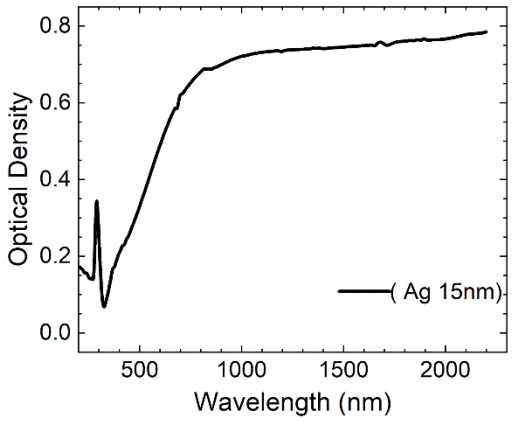

Fig. S1 The Optical Density spectrum of the Ag layer with the deposition thickness of 15nm is displayed and no LSPS peak is detected.

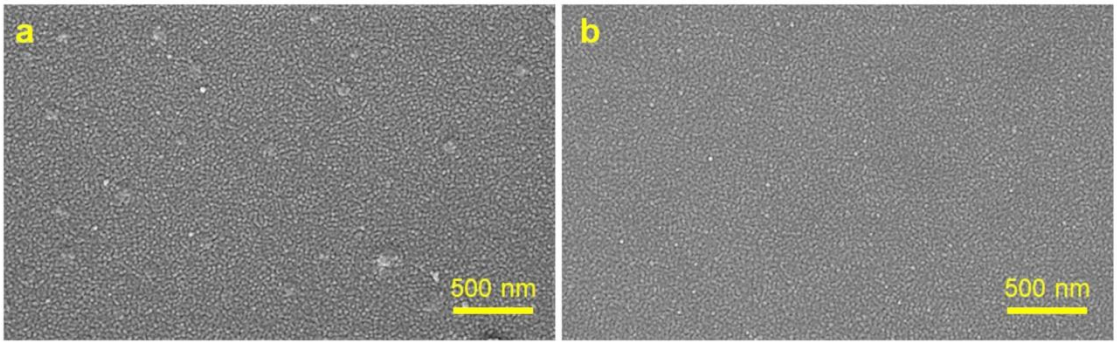

Fig. S2 The FESEM image of the Ag layer with the deposition thickness of 15nm on (a) a glass substrate and (b) a silicon substrate.

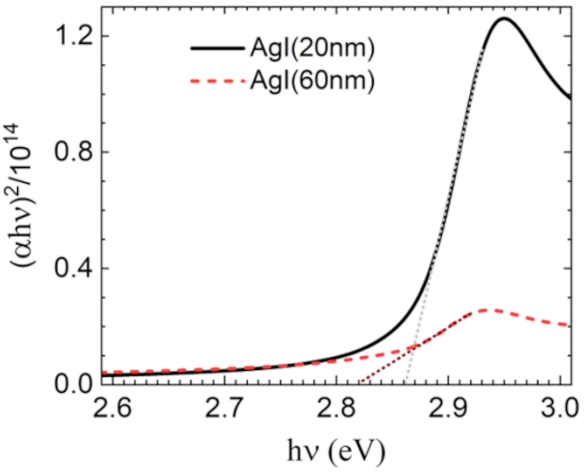

Fig. S3 Tauc plot ($(\alpha h\nu)^2$ versus photon energy $(h\nu)$) for AgI(20nm) and AgI(60nm) films.

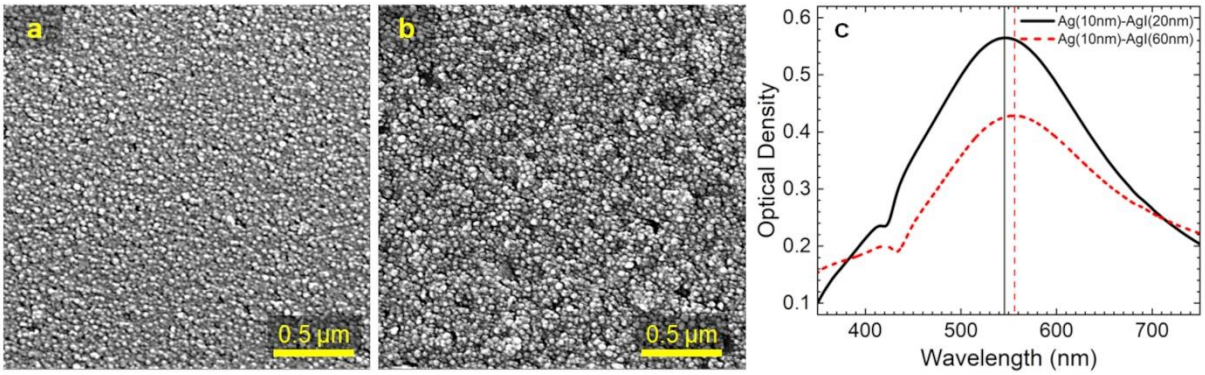

Fig. S4 (a) FESEM image of Ag(10nm)-AgI(20nm) film, (b) FESEM image of Ag(10nm)-AgI(60nm) film, and (c) OD spectra of Ag-AgI films when the related OD spectrum of AgI film is subtracted.

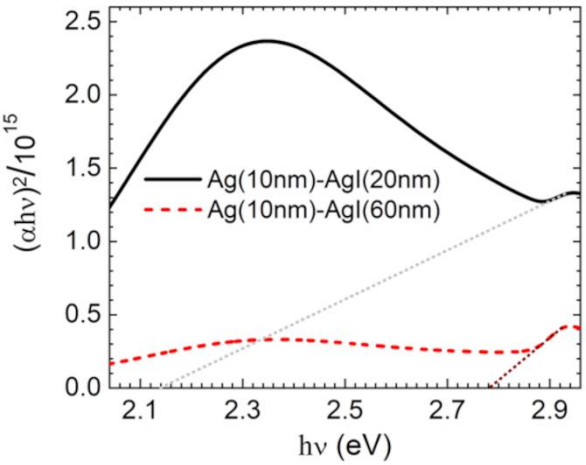

Fig. S5 Tauc plot ($(\alpha h\nu)^2$ versus photon energy $(h\nu)$) of Ag(10nm) – AgI(20nm) and Ag(10nm) – AgI(60nm) films.

Table S1 The Ag and β-AgI crystallite grain size of Ag-AgI films before and after laser irradiation.

Sample	wavelength	crystallite (grain) size	
		β-AgI	Ag
N-20	non-irradiated	12.1 nm	13.8 nm
R-20	632.8 nm	11.7 nm	13.2 nm
G-20	532 nm	15.4 nm	18.6 nm
B-20	450 nm	10.1 nm	20.9 nm
N-60	non-irradiated	15.7 nm	15.0 nm
R-60	632.8 nm	39.3 nm	18.8 nm
G-60	532 nm	35.3 nm	18.5 nm
B-60	450 nm	31.6 nm	17.6 nm

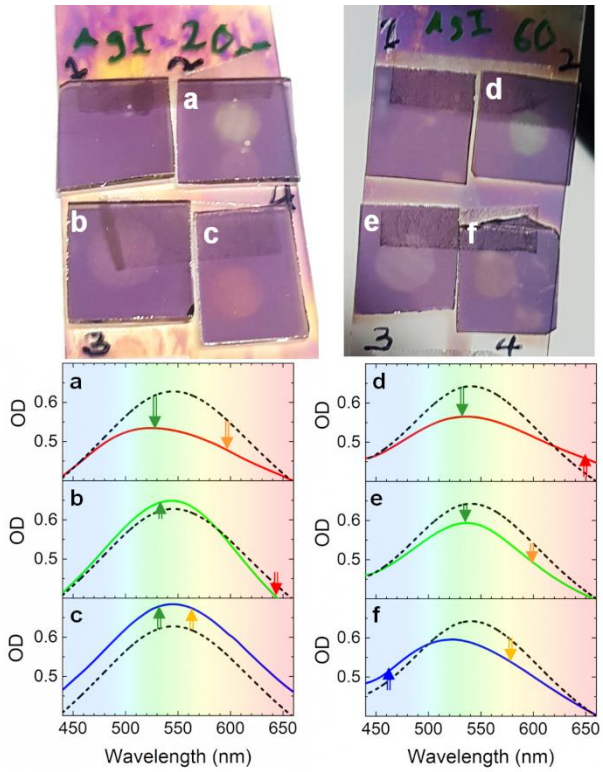

Fig. S6. OD spectra of non-irradiated Ag–AgI samples (dashed lines) are compared by OD spectra of irradiated samples (solid lines) for (a) R-20 sample, which shows an absorption decrease in the green and yellow region (green-yellowish color), (b) G-20 sample, which shows an absorption decrease in the red region and an absorption increase in the green region (bright red color), (c) B-20 sample, which shows the absorption increase at the peak position in the green and yellow region (red color), (d) R-60 sample, which shows an absorption decrease in the green region and increase absorption in the red region (green color), (e) G-60 sample, which shows the absorption decrease in green and orange region (bright yellow color), and (f) B-60 sample, which shows an absorption decrease in yellow region and an increase in blue region (orange color).

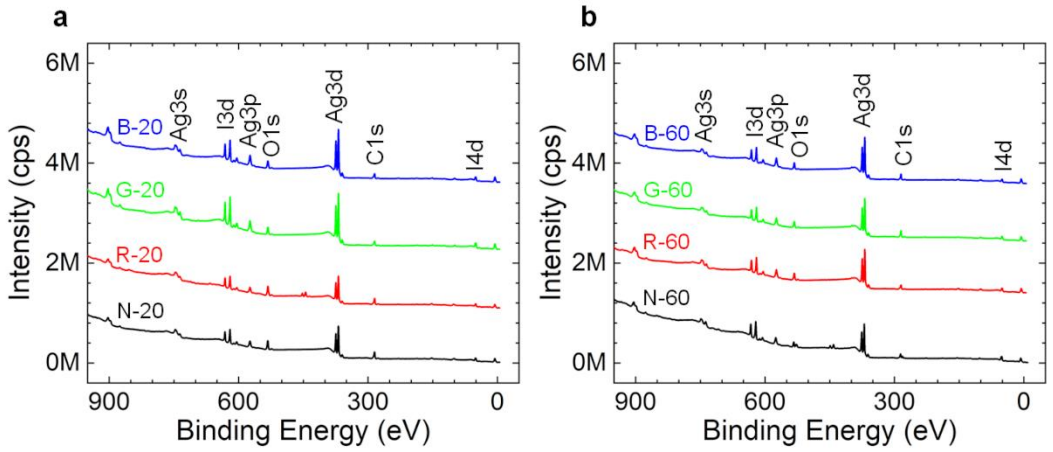

Fig. S7. The full XPS spectra of (a) Ag(10nm) – Ag(20nm) film, and (b) Ag(10nm) – Ag(60nm) film before and after laser irradiation. The presence of silver, iodine, oxygen, and carbon on the samples' surface is confirmed.

Table S2 The diameter of the exhibition zone to determine the antibacterial activities of Ag(10nm)-AgI(20nm) and Ag(10nm)-AgI(60nm) films on Staphylococcus aureus ATCC 25923.

sample	wavelength	zone inhibition
N-20	non-irradiated	25 mm
R-20	632.8 nm	22 mm
G-20	532 nm	16 mm
B-20	450 nm	20 mm
N-60	non-irradiated	15 mm
R-60	632.8 nm	16 mm
G-60	532 nm	19 mm
B-60	450 nm	17 mm

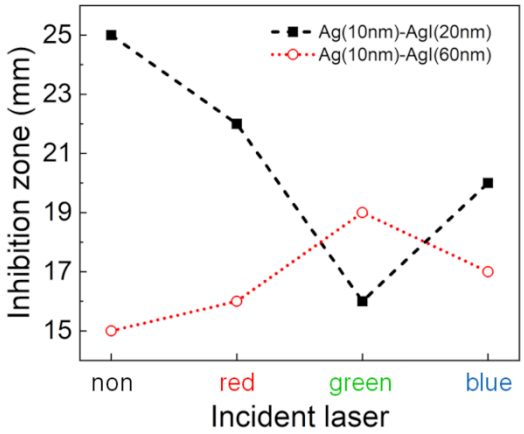

Fig. S8 Inhibition zone diameter versus the incident laser beam colour shows the interaction between the Ag to AgI concentration ratio and incident laser beam wavelength.

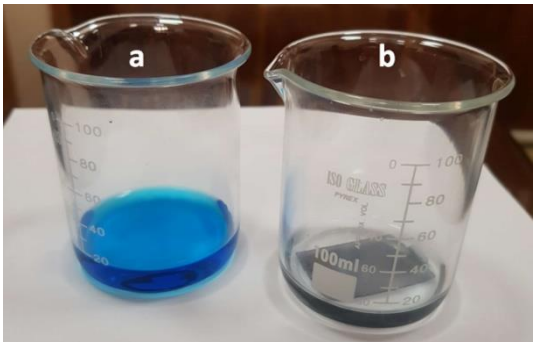

Fig. S9 (a) The solution of Methylene blue (10 ppm) and (b) the degeneration of Methylene blue by Ag(10nm)-AgI(60nm) film under UV light irradiated for 2.5 h.