SUPPORTING INFORMATION

Photocatalytic deposition of Au nanoparticles on $Ti_3C_2T_x$ MXene substrates for surface-enhanced Raman scattering

Zhi Yang[1], Lu Yang[1], Yucun, Liu[1,*] and Lei Chen[1,2,*]

1 College of Chemistry, Jilin Normal University, Siping 136000, China; yangzhi12260102@163.com (Z.Y.); yanglu4818@163.com (L.Y.)

2 School of Materials Science and Engineering, Jilin Jianzhu University, Changchun 130118, China

* Correspondence: liuyc19873@163.com (Y.L.); chenlei82@jlju.edu.cn (L.C.)

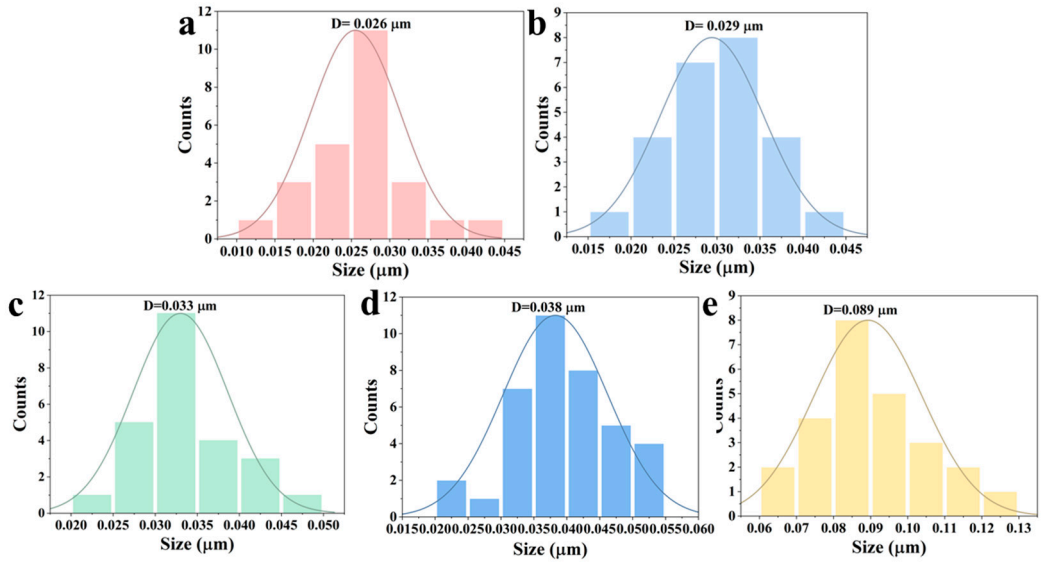

Figure S1. The size distribution of Au NPs absorbed on the surface of MXene nanosheets at different photoreaction time (10, 20, 30, 40, and 50 min)**.**

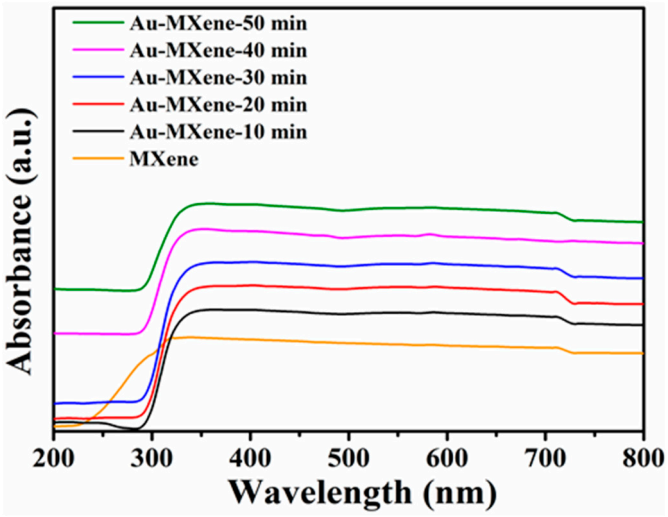

Figure S2. UV–Vis absorption spectra of MXene and Au-MXene composites (10, 20, 30, 40, and 50 min)

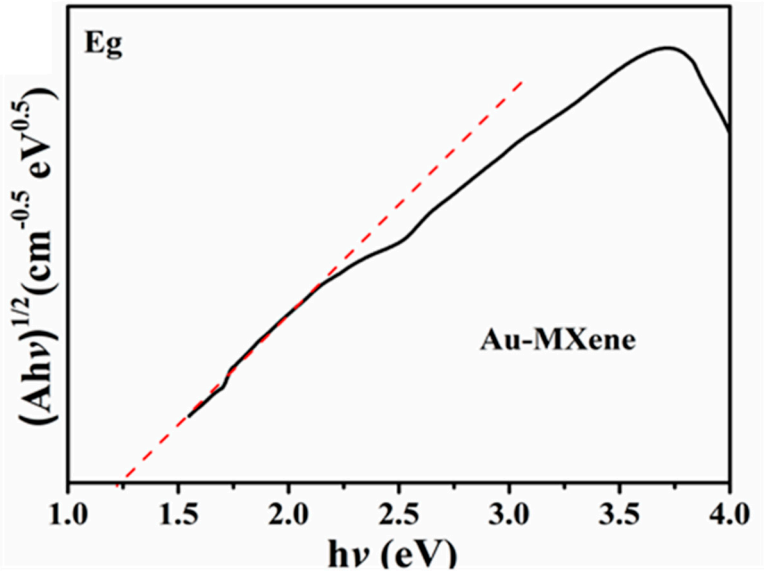

Figure S3. The plot of $(Ahν)^{1/2}$ versus photon energy (hν).

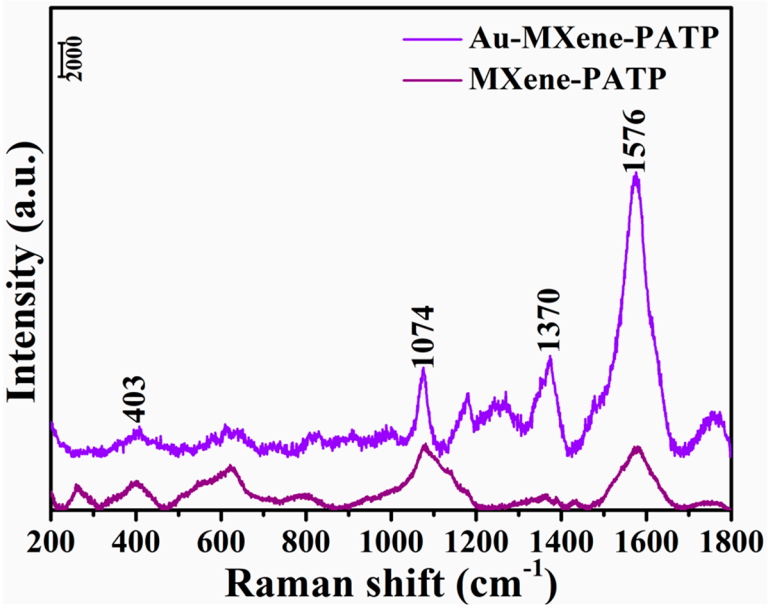

Figure S4. SERS spectra of PATP adsorbed on the MXene and Au-MXene composite.

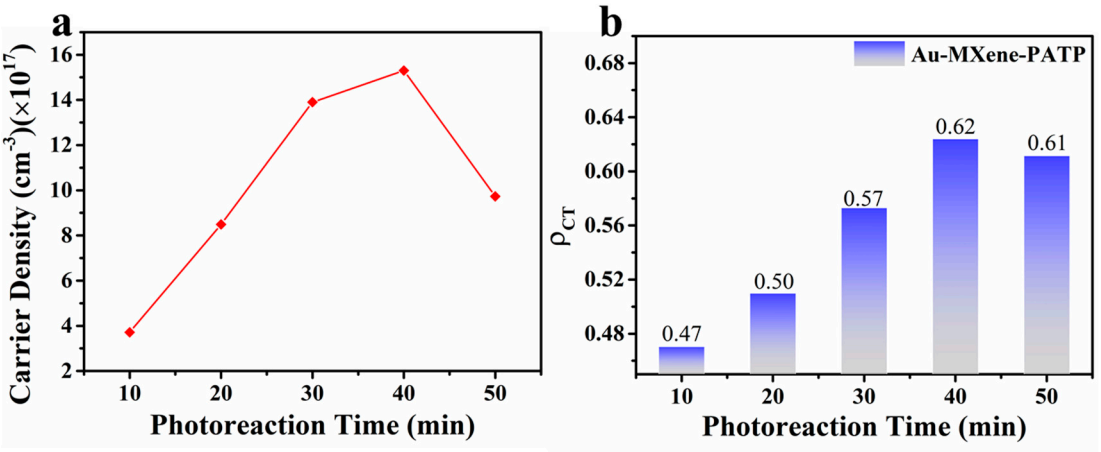

Figure S5. The photoreaction time of Au-MXene composites depends on the relationship between (a) carrier concentration and (b) charge transfer degree.

Table S1. Wavenumber and band assignments of the SERS spectra of the Au-MXene-PATP system based on 633 nm laser excitation[1].

Wavenumber (cm^{-1})	Assignment
403	O-H bending (MXene)
1074	C-S stretching (a1)
1180	C-H bending (b2)
1370	C-H bending + C-C stretching (b2)
1576	C-C stretching (a1)

The enhancement factor (EF) was calculated as follow:

$$EF = (I_{SERS}/N_{SERS})/ (I_{buik}/N_{bulk}) \quad (3)$$

Where I_{SERS} is the SERS signal intensity and I_{bulk} is the reference Raman signal intensity. N_{SERS} and N_{bulk} denote the number of molecules of the corresponding probe under laser irradiation, respectively.

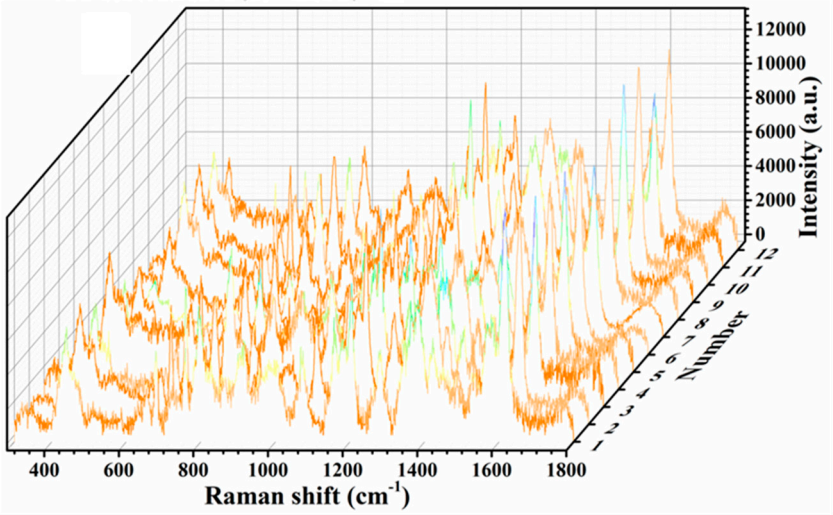

Figure S6. SERS spectra CBZ acquired from 12 randomly selected spots on the Au-MXene substrates (10^{-5} mol/L).

Table S2. Band assignment of carbendazim[2].

Solid Raman	SERS	Vibrational Description
655	680	Ring stretching and C–C bending
780	798	C–O–CH_3 bending
922	916	C–H bending
1021	1071	C–N bending
1228	1202	C–C bending and N–H bending
1274	1278	C–H stretching
1392	1380	C–N stretching
1618	1613	C=C stretching and C–C stretching

References

1. 1. Ji, R.; Sun, W.D.; Chu, Y. One-step hydrothermal synthesis of Ag/Cu_2O heterogeneous nanostructures over Cu foil and their SERS applications. *RSC Adv.* 2014; 4, 6055–6059.
2. Furini, L.N.; Sanchez-Cortes, S.; Lopez-Tocon, I.; Otero, J.C.; Aroca, R.F.; Constantino, C.J.L. Detection and quantitative analysis of carbendazim herbicide on Ag nanoparticles via surface-enhanced Raman scattering. *J. Raman Spectrosc.* 2015; 46, 1095–1101.