Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supplementary Information

Silver nanoparticle-decorated titanium dioxide nanowire systems via bioinspired poly(L-DOPA) thin film as surface-enhanced Raman spectroscopy (SERS) platform, and photocatalyst

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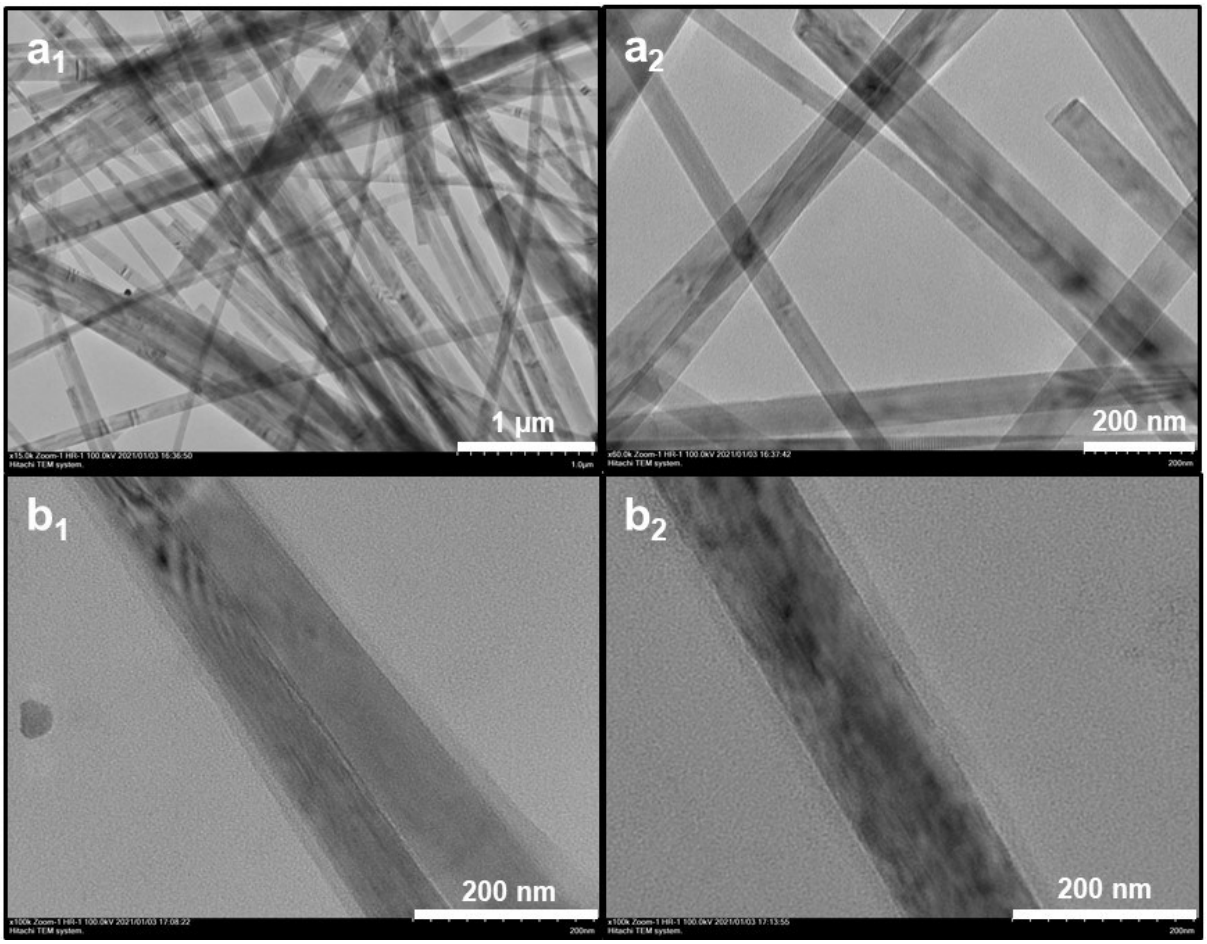

Figure S1. Representative TEM images of TiO_2 NWs (a) and TiO_2@PLDOPA systems (b) at different magnifications.

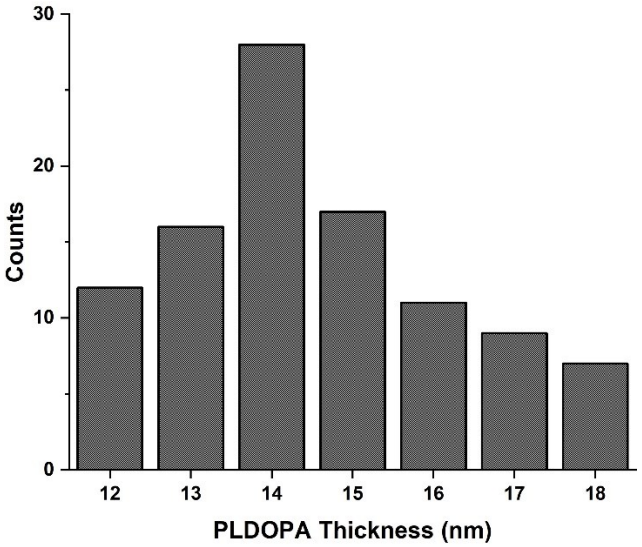

Figure S2. Histogram of PLDOPA thickness onto the TiO_2 NWs. At least 100 measurements were collected from the random sites of different TiO_2@PLDOPA NPs.

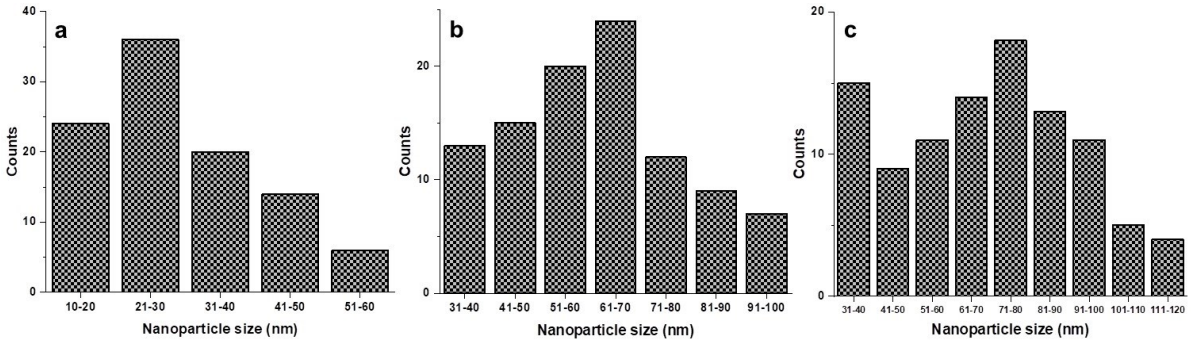

Figure S3. Histograms of silver nanostructures onto the TiO_2 @PLDOPA NPs for a different amount of silver. (a) TiO_2@PLDOPA@Ag1, (b) TiO_2@PLDOPA@Ag2 and (c) TiO_2@PLDOPA@Ag3. At least 100 measurements were collected from the randomly selected silver nanostructures.

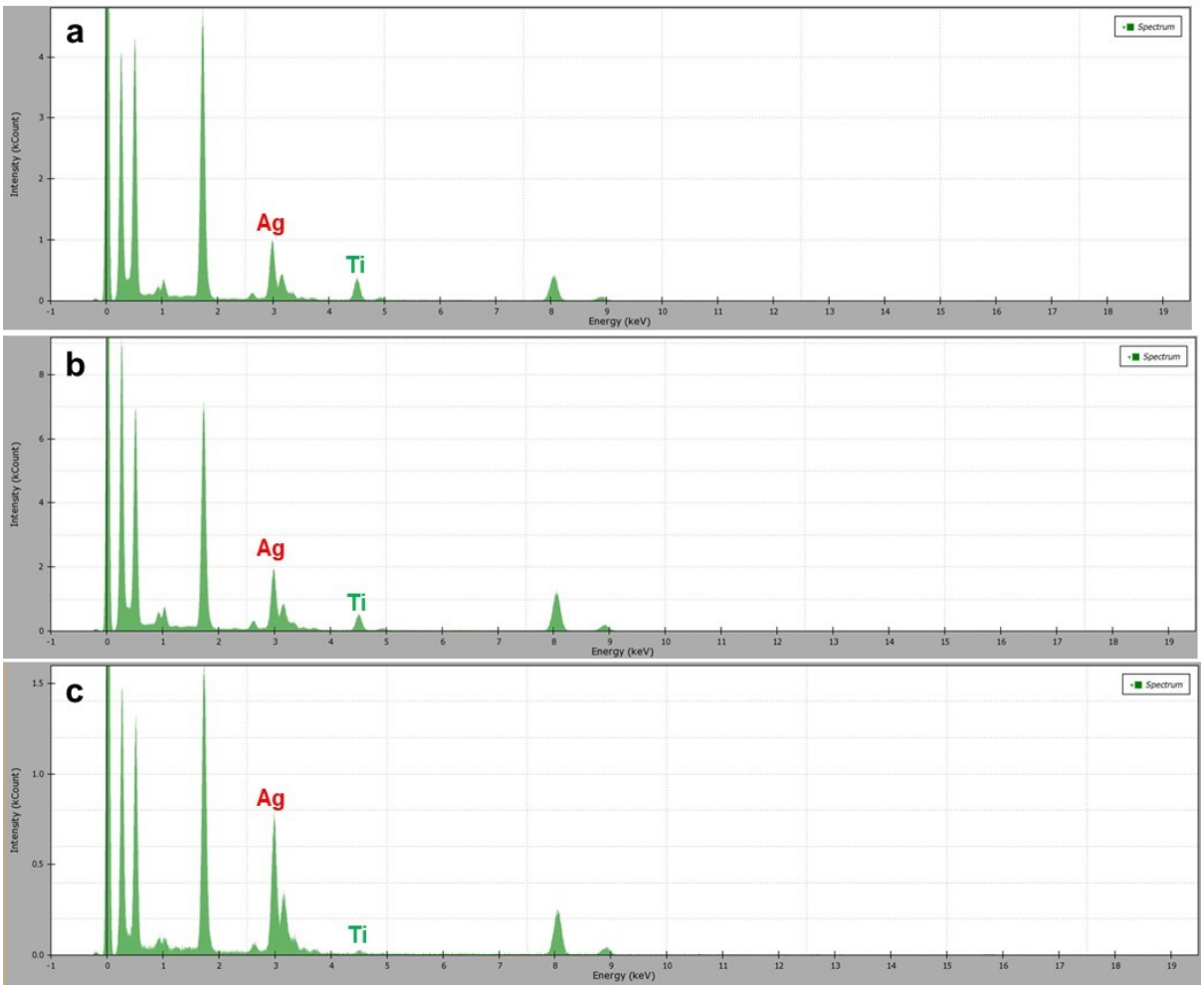

Figure S4. EDX spectra of TiO_2@PLDOPA@Ag NP systems for a different amount of silver. (a) TiO_2@PLDOPA@Ag1, (b) TiO_2@PLDOPA@Ag2 and (c) TiO_2@PLDOPA@Ag3.

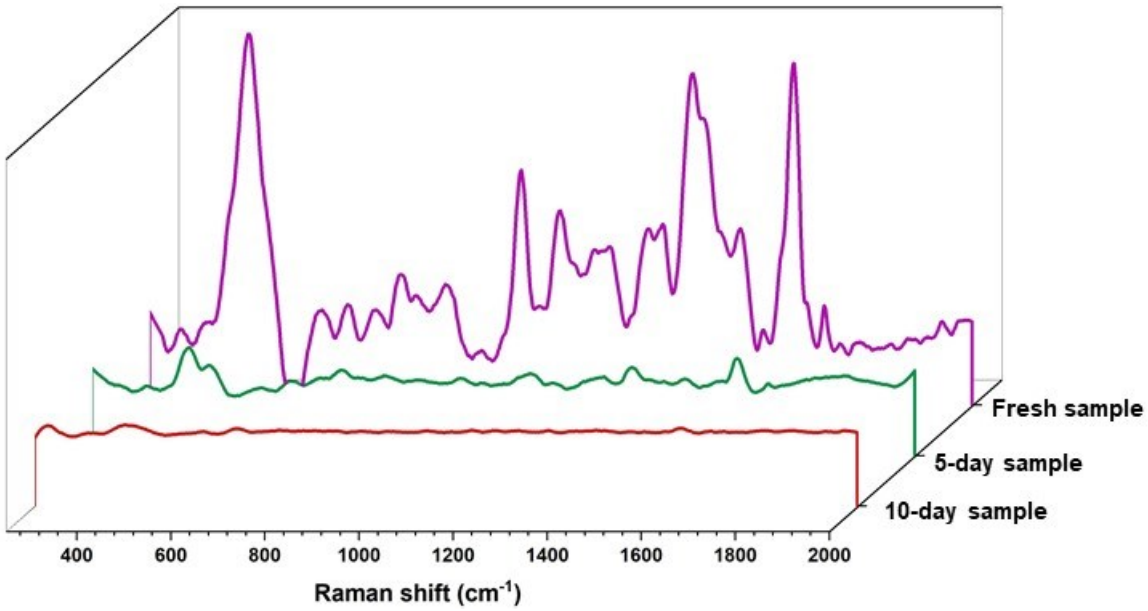

Figure S5. Catalytic degradation of MB over time in the presence of TiO_2@PLDOPA@Ag2 NP system at ambient condition.

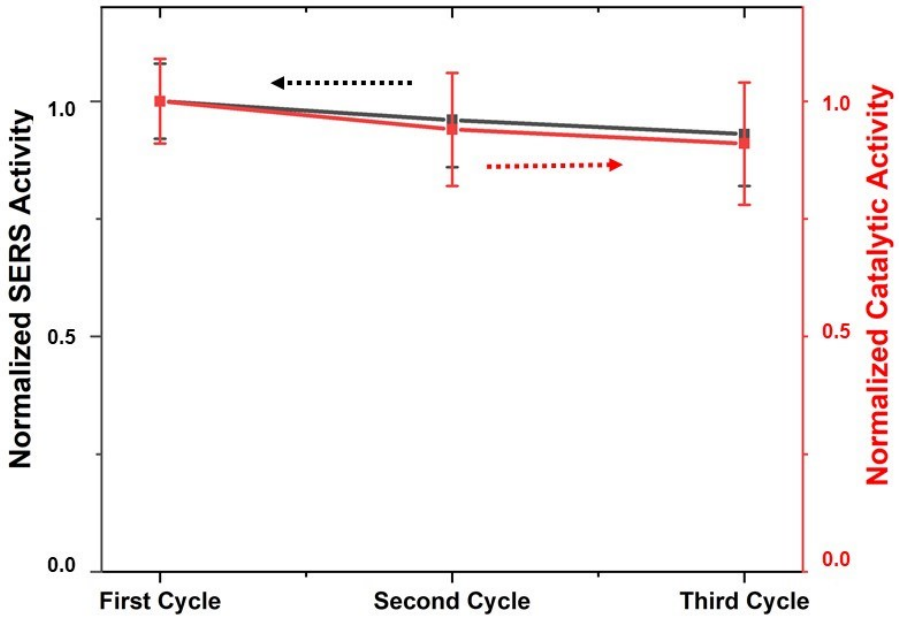

Figure S6. The reusability of TiO_2@PLDOPA@Ag2 NP system on SERS and catalytic activity over three cycles.

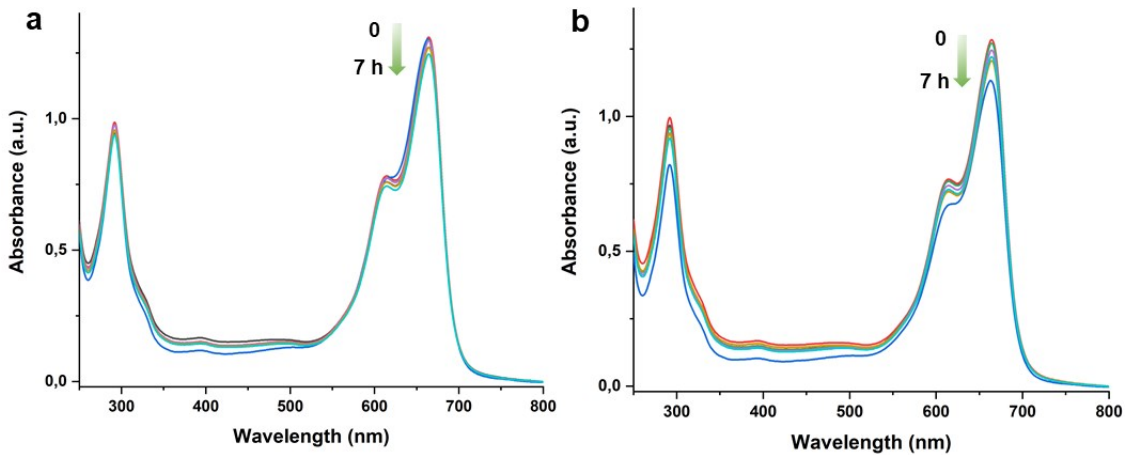

Figure S7. Time evolution of the UV-vis spectra indicating the conversion of MB in the presence of TiO_2 NWs (a) and, citrate-stabilized silver NPs.

Table S1. The comparison of AuNP or AgNP decorated TiO_2 nano/microparticles SERS active materials from literature.

Reference	***SERS Platform***	***Prope Molecule***	***Enhancement Factor***
Shan et al.[1]	Hydrogenated TiO_2 NWs@Ag	Rhodamine 6G	~10^5
Ling et al.[2]	Ag-embedded TiO_2 nanotubes array	Rhodamine 6G	NA
Kumar et al.[3]	AgNP decorated TiO_2 nanorod array	Rhodamine 6G	~10^5
Xie et al.[4]	AuNP decorated TiO_2 nanorod arrays	Rhodamine 6G	~10^4
Dinc et al.[5]	Au nanoisland decorated TiO_2 nanorod arrays	Methylene blue	~10^2
This study	TiO_2@PLDOPA@Ag NP systems	Methylene blue	5.1×10^5

Table S2. The comparison of AuNP or AgNP decorated TiO_2 nano/microparticles catalytic systems from literature.

Reference	***Catalytic Platform***	***Catalytic Conversion***	***Rate Constant (h^{-1})***
Ali et al.[6]	Ag-doped TiO_2 nanoparticles	Degradation of methylene blue	NA
Kumar et al.[3]	AgNP decorated TiO_2 nanorod array	Degradation of Rhodamine 6G	2.58
Liang et al.[7]	Ag/TiO_2 nanoparticles	Degradation of Rhodamine B	NA
Ma et al.[8]	Ag/TiO2 hollow nanospheres	Degradation of methylene blue	0.6-2.1
Mrowetz et al.[9]	Au/TiO_2 systems	Degradation of acid red 1	0.13-0.29
This study	TiO_2@PLDOPA@Ag NP systems	Degradation of methylene blue	0.083-0.644

References

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