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Supplementary data

Photocatalytic self-cleaning and recyclable AuNBPs@TiO_2 SERS chip for trace detection and *in situ* monitoring of methylene blue degradation

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1. Supplementary figures

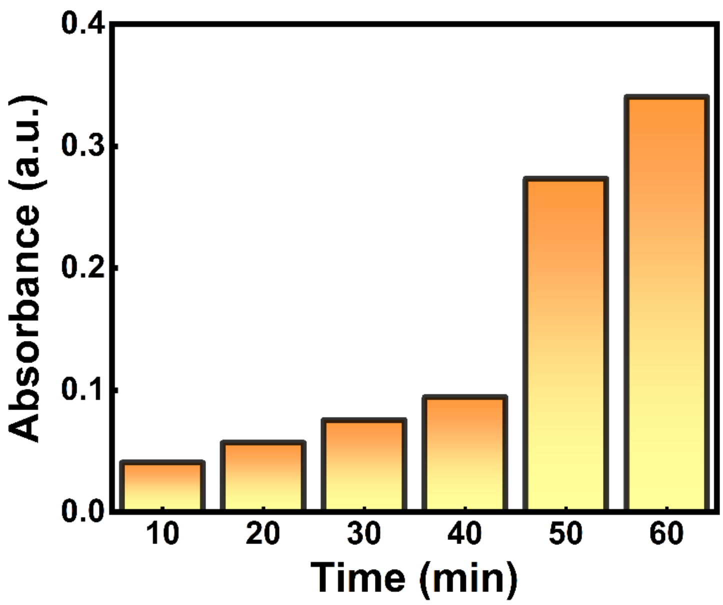

Figure S1. The variation of characteristic absorbance at 755 nm with reaction time.

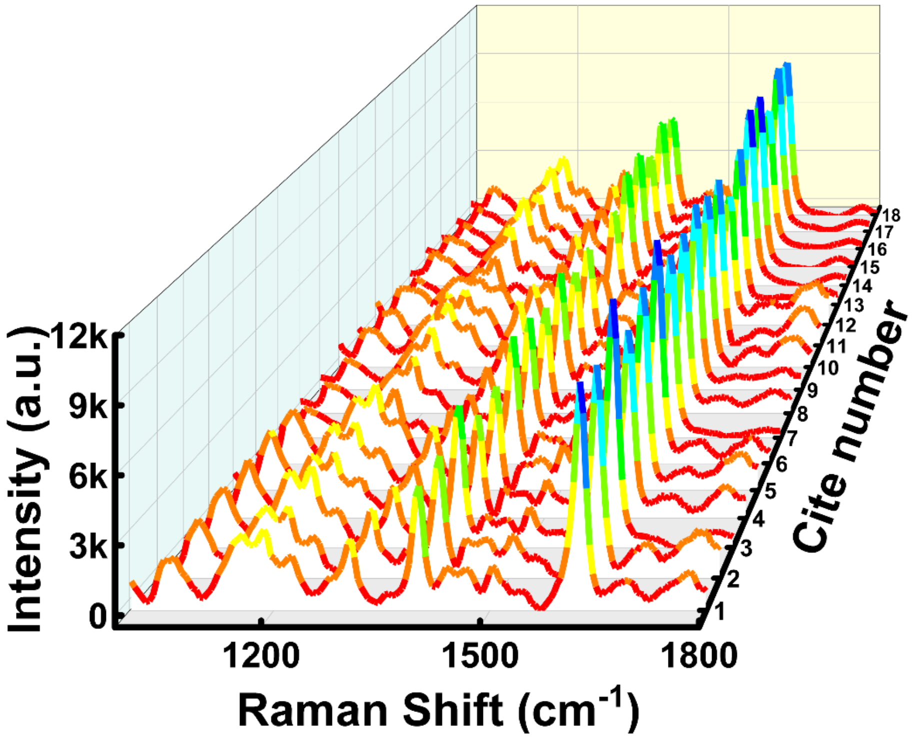

Figure S2. SERS spectra of the AuNBPs@TiO_2 SERS chips prepared from six randomly selected batches.

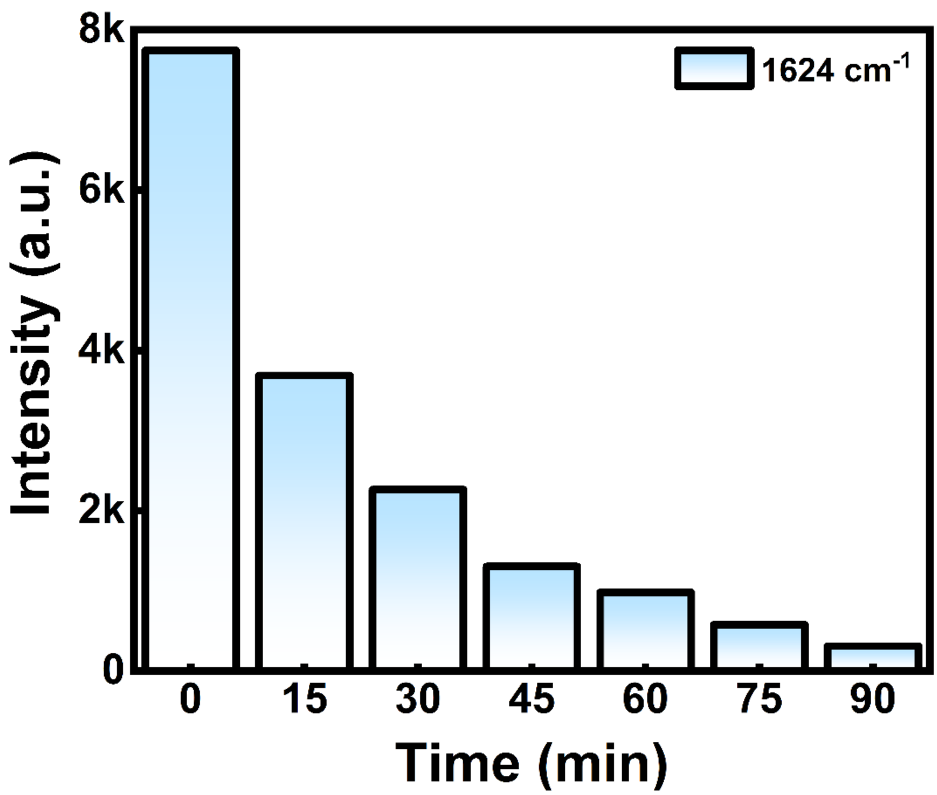

Figure S3. Time dependent SERS intensity of 10^{-5} M MB solution at 1624 cm^{-1} on the AuNBPs@TiO_2 under xenon lamp irradiation.

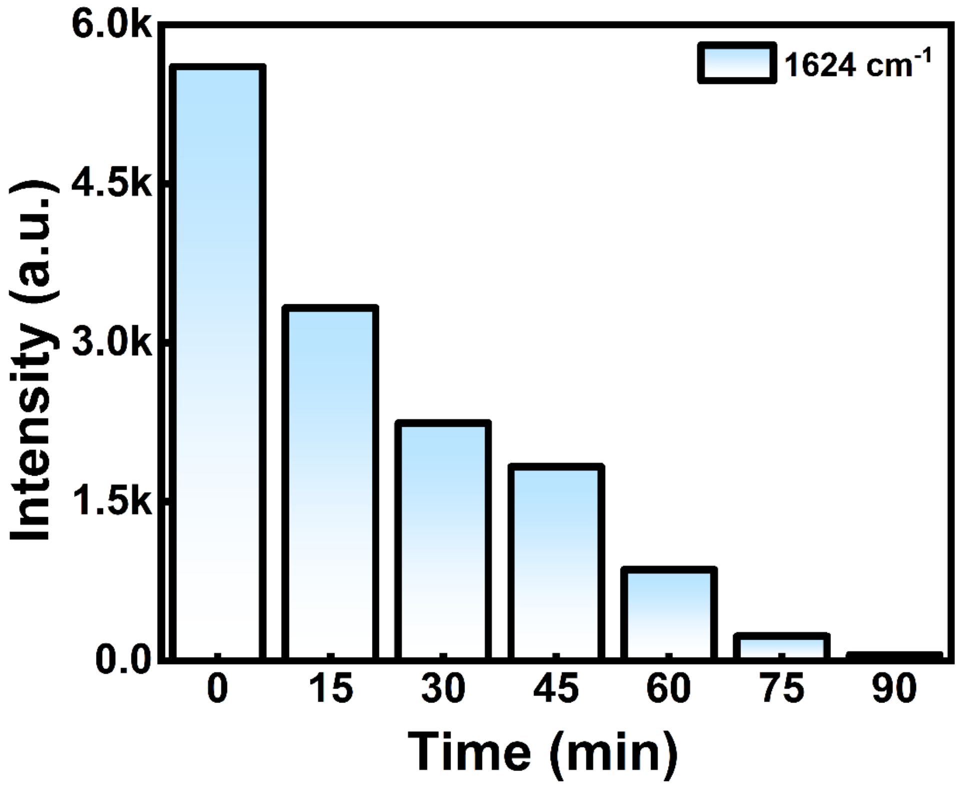

Figure S4. Time dependent SERS intensity of 10^{-4} M MB solution at 1624 cm^{-1} on the AuNBPs@TiO_2 under xenon lamp irradiation.

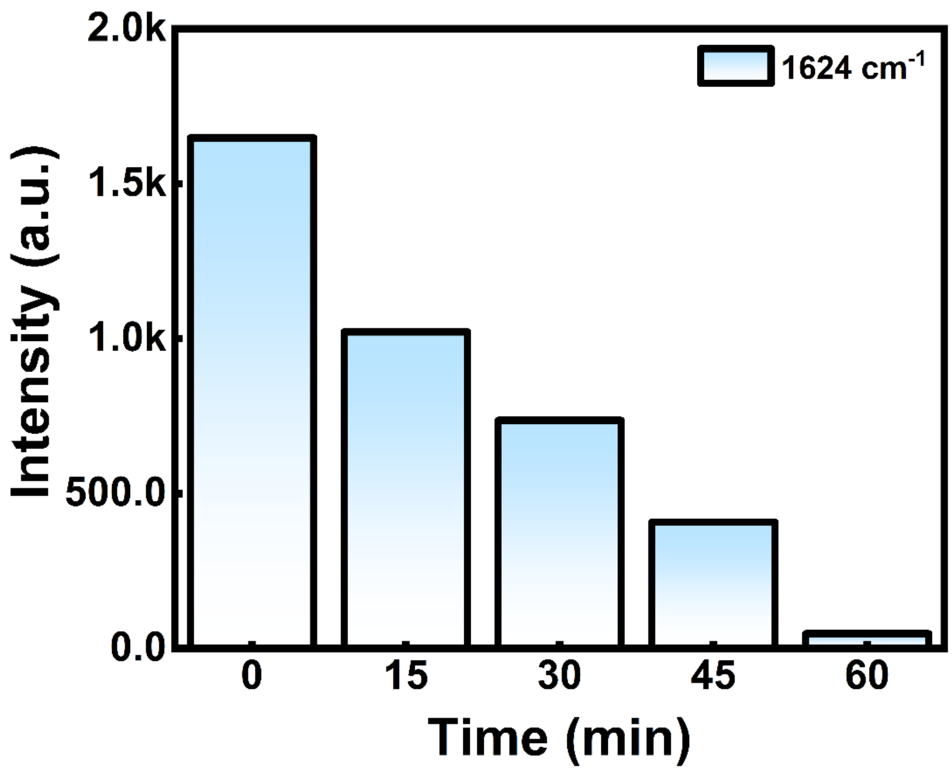

Figure S5. Time dependent SERS intensity of 10^{-6} M MB solution at 1624 cm^{-1} on the AuNBPs@TiO_2 under xenon lamp irradiation.

2. Supplementary tables

Table S1. Comparison of the SERS response of AuNBPs and AuNBPs@TiO_2 substrates.

Substrate	Intensity at 1624 cm^{-1} (a.u., mean ± SD)	RSD (%)	Enhancement (%)	Number of measurements
AuNBPs	20,614 ± 899	4.36	–	5
AuNBPs@TiO_2	28,122 ± 1043	3.71	36.42	5

Table S2. Performance comparison of different previously reported self-cleaning SERS substrates.

SERS substrate	Target analyte	LOD (mol/L)	Recycling performance	Reference
Au/TiO_2 thin film	MB	10^{-11}	5 cycles	[1]
Ag@TiO_2 nanogranular	MB	10^{-9}	–	[2]
AuNPs/TiO_2 nanotube	R6G	10^{-9}	7 cycles	[3]
MoS_2/Ag@rGO	17β-E_2	5×10^{-12}	–	[4]
Au@TiO_2@Ag hierarchical	Antibiotics	10^{-12}	87.4% recovery over 5 cycles	[5]
Au-Ag/TiO_2/PS	Crystal violet	10^{-11}	5 cycles	[6]
Au-MoS_2 nanoflowers	Crystal violet	10^{-16}	92.2 % recovery over 5 cycles	[7]
UiO-66/AgNPs/TiO_2	R6G/thiram	$10^{-11}/10^{-9}$	89.2% recovery over 3 cycles	[8]
MoS_2/ZnO-microtube	MB	10^{-12}	10 cycles	[9]
AuNBPs@TiO_2 chip	MB	3.3×10^{-9}	89.5% recovery over 8 cycles 72% after 12 cycles	This work

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