Electronic Supplementary Material (ESI) for Dalton Transactions.
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Appendix A. Supplementary data

Solar-driven photoelectrocatalytic degradation of anticancer drugs using TiO_2 nanotubes decorated of SnS quantum dots

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Table S1. Elemental composition (in atomic %) in the surface layer of SnS-modified TiO_2 NTs, evaluated by XPS analysis.

Sample label	Elemental composition (atomic %.)							O/Ti	Sn/S	(Sn+S)/(Ti+O)	S*/Ti	(SnS/TiO_2)**
	Ti	O	Sn	S	C	N	Cl					
IISnS-Ti/TiO_2	20.38	59.57	3.99	2.60	12.57	0.77	0.12	2.92	1.53	0.082	0.106	0.071
IIISnS-Ti/TiO_2	21.16	59.03	3.28	1.83	13.37	1.14	0.19	2.79	1.79	0.064	0.068	0.045
IVSnS-Ti/TiO_2	17.40	54.01	8.42	6.66	12.70	0.70	0.11	3.10	1.26	0.211	0.360	0.240
VISnS-Ti/TiO_2	14.08	49.79	13.54	12.22	9.71	0.50	0.16	3.54	1.11	0.403	0.832	0.555
XSnS-Ti/TiO_2	7.83	38.41	18.28	17.86	17.23	0.39	<0.05	4.91	1.02	0.782	2.231	1.487
Ti/TiO_2	22.81	59.01	-	0	18.18	0	0	2.59	-	-	-	-

S* - SnS fraction of sulfur (see SnS fraction of S $2p_{3/2}$ in Table S2)

**assuming atomic ratio Sn:S = 1:1 for SnS and Ti:O = 1:2 for TiO_2 we can roughly estimate SnS/TiO_2 to be 2S*/3Ti

Table S2. Chemical character of Sn and S components in the surface layer of SnS-Ti/TiO_2 nanocomposites, evaluated through deconvolution of Sn 3d and S 2p high resolution XPS spectra.

Sample label	Sn $3d_{5/2}$ fraction (atomic %)		S $2p_{3/2}$ fraction (atomic %)	
	SnS, SnO	$SnSO_4$, SnO_2	SnS	$SnSO_4$
	485.0- 485.6 eV	486.4-486.8 eV	160.8-161.5 eV	168.4-169.4 eV
IISnS-Ti/TiO_2	11.4	88.6	83.3	16.7
IIISnS-Ti/TiO_2	14.2	85.8	79.2	20.8
IVSnS-Ti/TiO_2	19.6	80.4	94.0	6.0
VISnS-Ti/TiO_2	30.1	69.9	95.9	4.1
XSnS-Ti/TiO_2	20.6	79.4	97.8	2.2

Table S3. The first rate constant *k* for anticancer drugs photoelectrocatalytic (PEC), photocatalytic (PC) and electrochemical (E) decomposition, total organic carbon removal (ΔTOC), mineralization current efficiency (MEC) and consumed electrical energy (E_{EO})

Photoelectrode	Compound	Process	k (min^{-1})	R^2	ΔTOC (%)	MCE (%)	E_{EO} (kWh m^{-3} $order^{-1}$)
Ti/TiO_2	IF	PEC	0.0072	0.9827	37 ±1.5	89	13.7
IISnS-Ti/TiO_2	IF	PEC	0.0149	0.9846	27 ±2.1	62	5.44
IIISnS-Ti/TiO_2	IF	PEC	0.0153	0.9449	27 ±3.0	62	5.63
IVSnS-Ti/TiO_2	IF	PEC	0.017	0.9822	27 ±1.8	62	5.73
VISnS-Ti/TiO_2	IF	PEC	0.0178	0.9827	56 ±4.5	129	6.63
XSnS-Ti/TiO_2	IF	PEC	0.0139	0.9815	1 ±0.3	2.3	7.84
VISnS-Ti/TiO_2	IF	PC	0.0085	0.9825	6.5 ±0.5	12	12.1
VISnS-Ti/TiO_2	IF	E	-	-	0	-	-
Ti/TiO_2	5-FU	PEC	0.0104	0.9959	14 ±0.4	14.5	9.58
VISnS-Ti/TiO_2	5-FU	PEC	0.0169	0.9982	46 ±3.6	47.1	6.34
VISnS-Ti/TiO_2	5-FU	PC	0.0063	0.9849	0	-	13.3
VISnS-Ti/TiO_2	5-FU	E	-	-	0	-	-
Ti/TiO_2	IMB	PEC	0.0084	0.9779	3 ±0.2	1.2	9.54
VISnS-Ti/TiO_2	IMB	PEC	0.0149	0.9885	15 ±1.5	47.5	6.66
VISnS-Ti/TiO_2	IMB	PC	0.0066	0.9957	0	-	16.7
VISnS-Ti/TiO_2	IMB	E	-	-	0	-	-
VISnS-Ti/TiO_2	IF	PEC (0.5 V)	0.0123	0.9787	15 ±1.1	36	8.17
VISnS-Ti/TiO_2	IF	PEC (1.5 V)	0.0107	0.9777	0	-	9.42

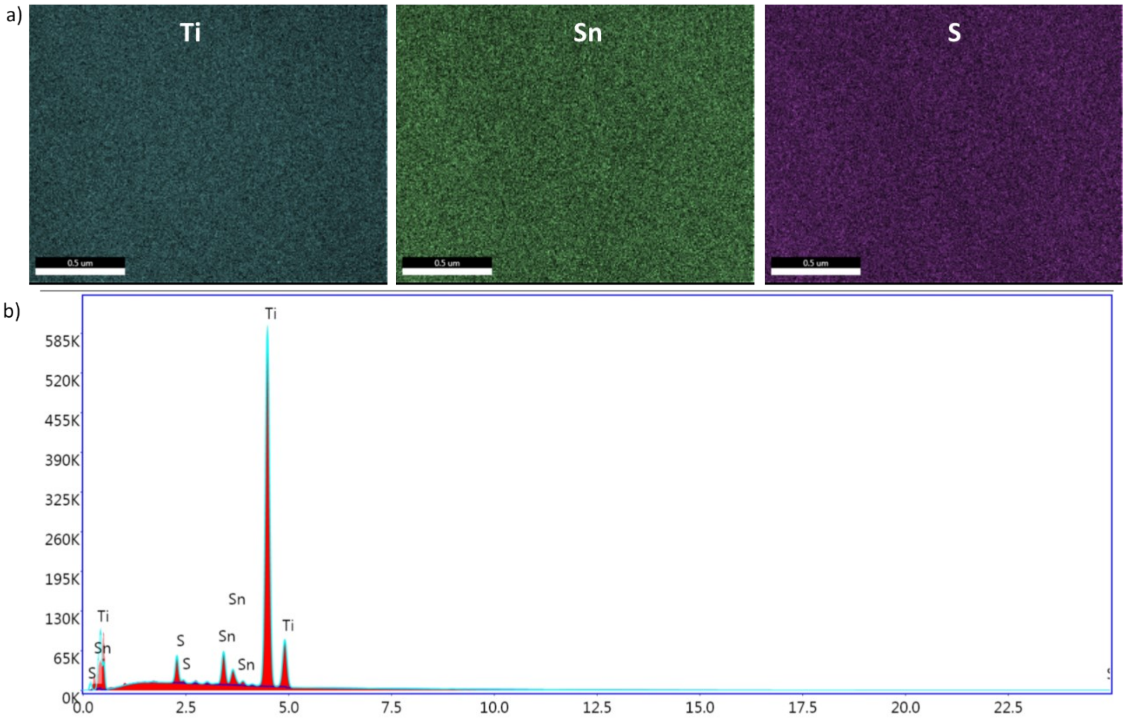

Fig. S1. The EDS (a) mapping and (b) spectrum of VISnS-Ti/TiO_2 photoelectrodes.

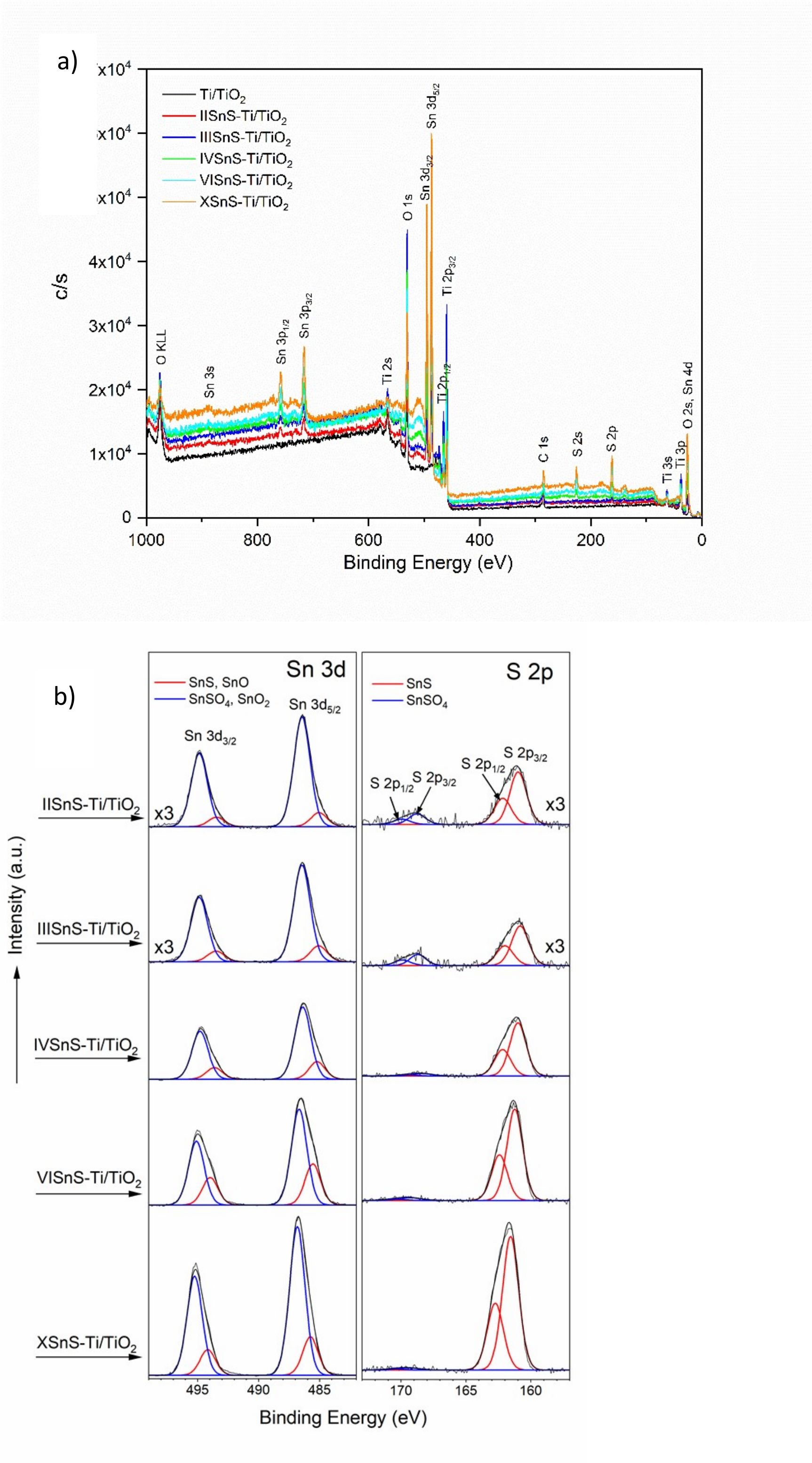

Fig. S2. The survey spectra a) and high resolution Sn3d and S2p XPS spectra b) recorded on SnS-Ti/TiO_2 nanocomposites prepared using 2, 3, 4, 6 and 10 SILAR cycles.

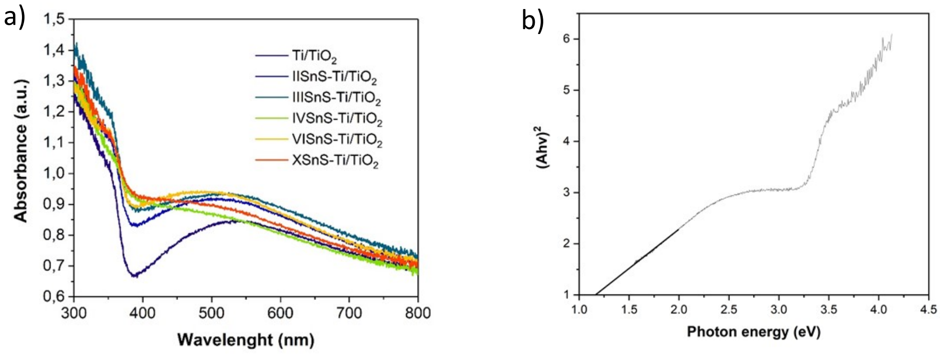

Fig. S3. UV-Vis spectra of the Ti/TiO_2 and $SnS\text{-}Ti/TiO_2$ photoelectrodes (a) and Tauc plot of $VISnS\text{-}Ti/TiO_2$ photoelectrode (b).

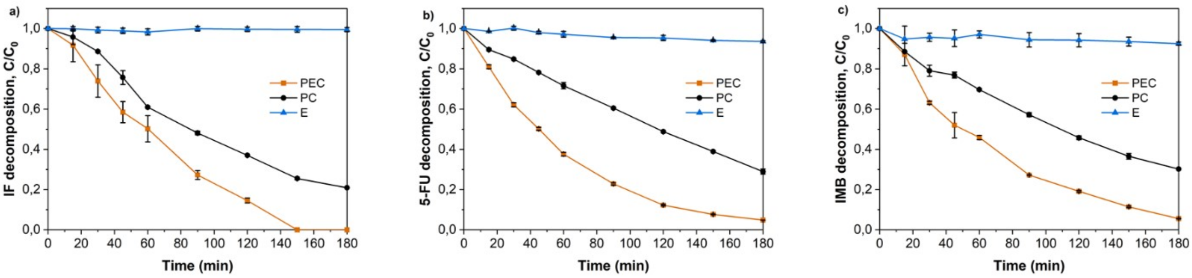

Fig. S4. Photoelectrocatalytic (PEC), photocatalytic (PC) and electrochemical (E) decomposition of IF a), 5-FU b) and IMB c).

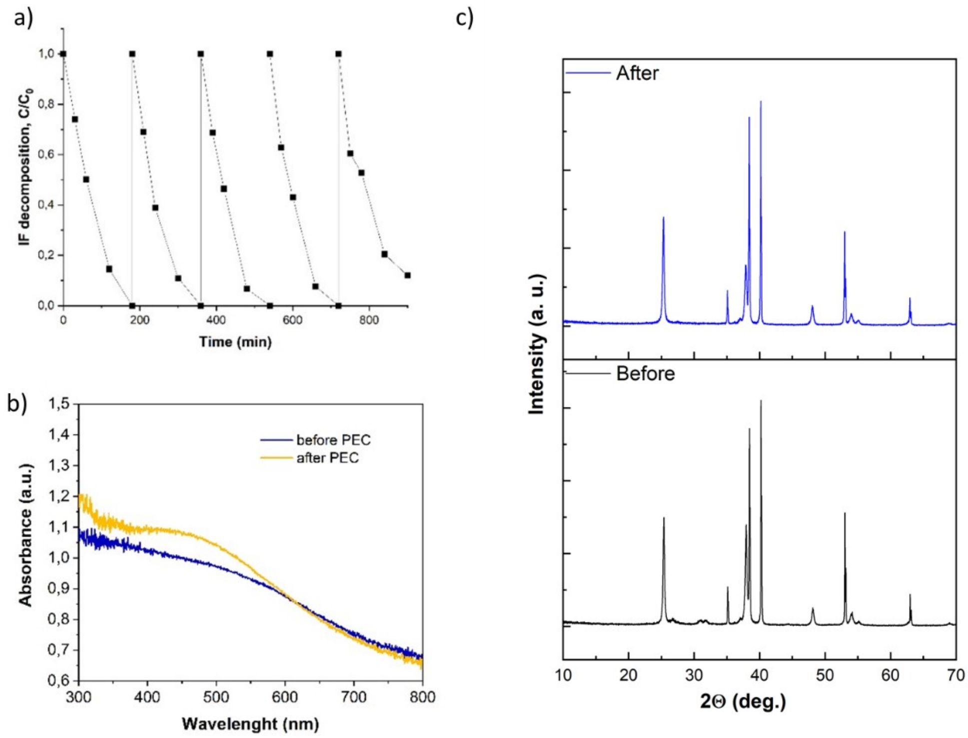

Fig. S5. The recycled PEC degradation of IF for VISnS/Ti/TiO_2 (a) and DRS UV-Vis (b) and XRD (c) analysis of photoelectrode SnS-Ti/TiO_2 before and after stability test

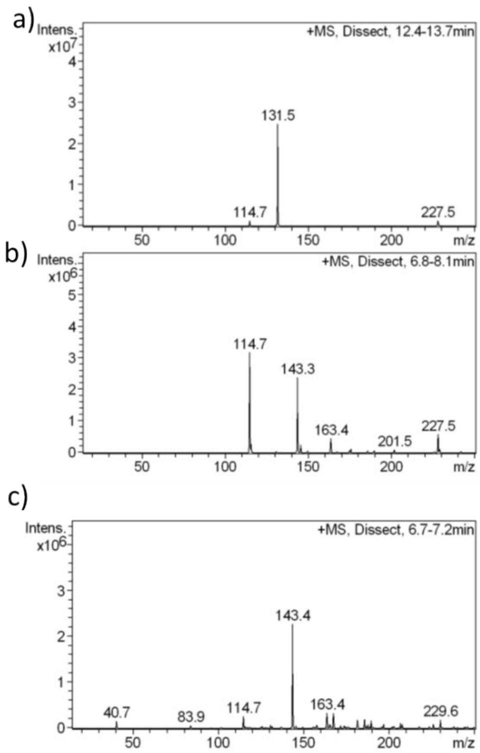

Fig. S6. MS spectra of 5-FU (a) and degradation products with $[M+H]^+$=163 (b) and $[M+H]^+$= 143 (c).

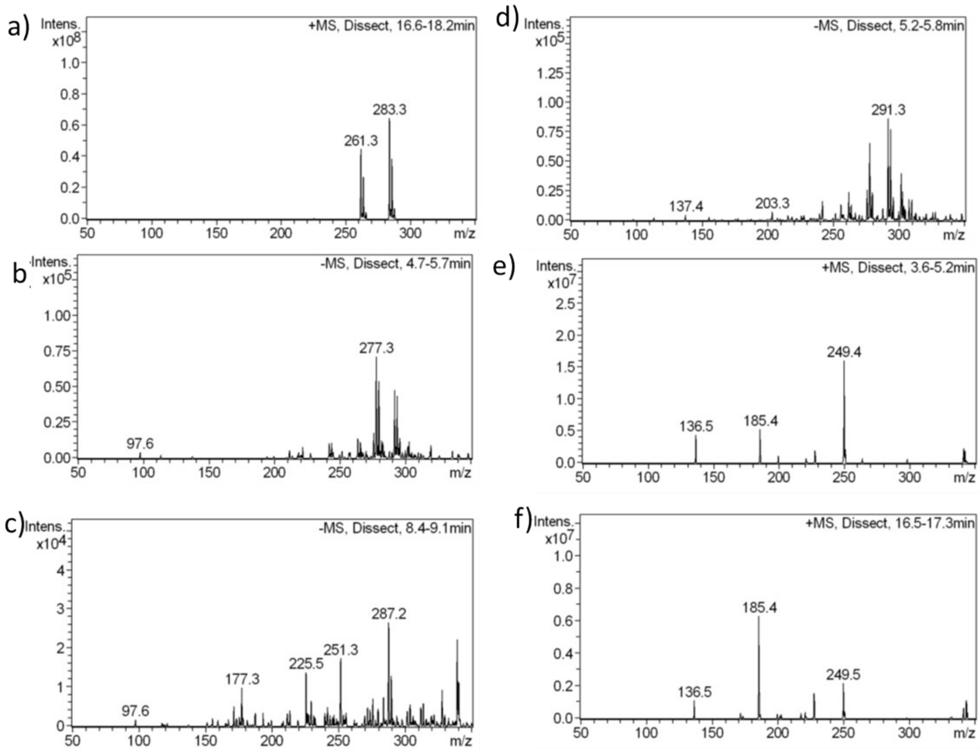

Fig. S7. MS spectra of IF (a) and degradation products with $[M-H]^-$=277 (b), $[M-H]^-$ = 287 (c), $[M-H]^-$ = 291 (d), $[M+H]^+$= 249 (e) and $[M+H]^+$= 185 (f).

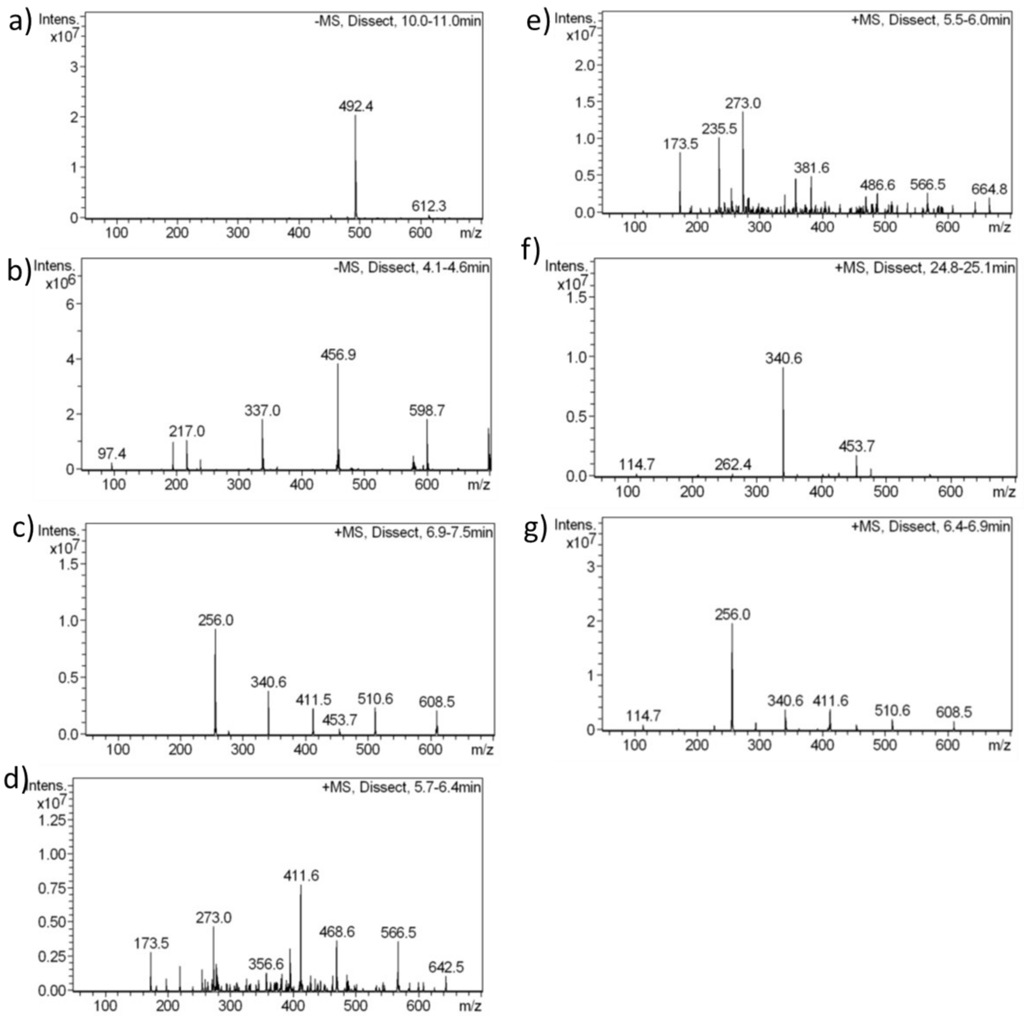

Fig. S8. MS spectra of IMB (a) and degradation products with $[M-H]^-$=337 (b), $[M+H]^+$=510 (c), $[M+H]^+$= 411 (d), $[M+H]^+$= 273 (e), $[M+H]^+$= 262 (f) and $[M+H]^+$= 256 (g).