

Supplementary Information

**Recent advances in photothermal applications of two-dimensional nanomaterials:
photothermal therapy and beyond**

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Table S1 Photothermal applications of 2D nanomaterials and their composites.

Photothermal application	Materials	Light source	Temperature (°C)	Ref.
	PEGylated GO nanosheets	2 W cm ⁻² 808 nm NIR light	58	86
	DOX-BSA-rGO nanosheets	5.5 W cm ⁻² 808 nm NIR light	58	87
	indocyanine green-loaded PDA-rGO nanocomposite	0.6 W cm ⁻² 808 nm NIR light	54	93
	MnO _x /TiO ₂ -GR-PVP nanocomposites	2.0 W cm ⁻² 808 nm NIR light	60	96
	SP-Ti ₃ C ₂ nanosheets	2.0 W cm ⁻² 808 nm NIR light	55	100
	Ti ₃ C ₂ /Au nanocomposite	1 W cm ⁻² 1064 nm NIR light	48	104
	Nb ₂ C nanosheets	1.5 W cm ⁻² 808 nm NIR light	60	107
Photothermal therapy	MnO _x /Ta ₄ C ₃ -SP nanocomposite	1.5 W cm ⁻² 808 nm NIR light	50	109
	SP-Ta ₄ C ₃ nanosheets	1.5 W cm ⁻² 808 nm NIR light	52	110
	PEGylated MoS ₂ nanosheets	1 W cm ⁻² 808 nm NIR light	60	113
	MoS ₂ /Fe ₃ O ₄ /PEG composite	0.6 W cm ⁻² 808 nm NIR light	47	117
	WS ₂ @PEI-siRNA composite	1 W cm ⁻² 808 nm NIR light	53	130
	WS ₂ /lipid composite	2 W cm ⁻² 808 nm NIR light	60	133
	TiS ₂ /PEG nanosheets	0.8 W cm ⁻² 808 nm NIR light	65	134
	ReS ₂ /PEG nanosheets	0.6 W cm ⁻² 808 nm NIR light	45	137
	TaS ₂ /PEG nanosheets	2 W cm ⁻² 808 nm NIR light	65	138

SnS ₂ nanosheets	1.9 W cm ⁻² 808 nm NIR light	63	140
PEGylated Bi ₂ S ₃ nanosheets	2 W cm ⁻² 808 nm NIR light	50	141
BP-PEI-siRNA composite	1 W cm ⁻² 808 nm NIR light	45	161
BP@PEG/Ce6 nanosheets	0.65 W cm ⁻² 660 nm NIR light	38	162
Pd/DOX composite	0.6 W cm ⁻² 808 nm NIR light	38	177
CD-PdNS/ZIF-8 JNP	1 W cm ⁻² 1064 nm NIR light	60	179
MnO ₂ -SPs nanosheets	1.5 W cm ⁻² 808 nm NIR light	52	181
ferrocene-based MOF (Zr-Fc MOF) nanosheets	0.1 W cm ⁻² 808 nm NIR light	75	188
FeMn-LDH/methylene blue composite	1.0 W cm ⁻² 808 nm NIR light	50	191
PEGylated B nanosheets	2.0 W cm ⁻² 808 nm NIR light	37	193
Ti nanosheets	1.0 W cm ⁻² 808 nm NIR light	60	194
PEGylated Ge nanosheets	1.0 W cm ⁻² 808 nm NIR light	54	198
wood-GO composite	12 kW m ⁻² simulated solar light	67	48
rGO-MWCNT composite	1 kW m ⁻² simulated solar light	78	233
Al foil/rGO/Mn ₃ O ₄ composite	1 kW m ⁻² simulated solar light	42	236
MXene/PVDF composite	1 kW m ⁻² simulated solar light	75	237
SnO ₂ -SPM	simulated solar light	45	241
porphyrin-Ti ₃ C ₂ T _x MXene Janus membrane	simulated solar light	70	242

	PEGylated MoS ₂ /cotton cloth composite	1 kW m ⁻² simulated solar light	43	243
	MoS ₂ aerogels	1 kW m ⁻² simulated solar light	60	245
	melamine-PPy composite	simulated solar light	43	248
	Ni ₁ Co ₃ /PDA nanosheets	simulated solar light	36	250
	TiO ₂ -PDA/PPy/cotton composite	1 kW m ⁻² simulated solar light	48	253
	Ni ₃ S ₂ /Ni foam	simulated solar light	43	257
Thermochemical reaction	rGO/PPy nanosheets	2.6 W cm ⁻² 808 nm NIR light	380	49
Electrostatic lithography	Ti ₃ C ₂ T _x @PEI nanosheets	1.7 W cm ⁻² 808 nm NIR light	340	275
	Mg-Al LDHs matrix and Ru nanoparticles	300 W Xe lamp	350	276
	GO/UiO-66-NH ₂ fabrics	0.6 W cm ⁻² simulated solar light	80	279
Catalysis	CuO _x /ZnO/Al ₂ O ₃ nanosheets	simulated sunlight	297	283
	MoO _{3-x} -Ag composite	0.5 W cm ⁻² 808 nm NIR light	55	284
	Ni/Nb ₂ C composite	300 W Xe arc lamp	330	288
	Bi ₂ Se ₃ /g-C ₃ N ₄ nanocomposite	300 W Xe lamp	190	289
	PVDF/rGO/graphite-CNT composite	0.1 W cm ⁻² NIR light	42	52
Light-driven actuating	GO/sodium alginate composite	1.35 W cm ⁻² Xenon lamp	50	294
	MXene/polyethylene composite	200 mW cm ⁻² natural sunlight	50	298
Sensing	BP-Au-Ab composite	1.0 W cm ⁻² 808 nm NIR light	45	300

	Ti ₃ C ₂ T _x /ionic liquid gel	0.45 W 808 nm NIR light	256	302
	Ti ₃ C ₂ T _x nanosheets	NIR light	—	303
Photothermal electrode	MoS ₂ /PU composite	IR laser	70	54
	carbon felt/Ti ₃ C ₂ T _x composite	simulated sunlight	30	305
	PEG/Ti ₃ C ₂ T _x composite	sunlight	75	55
Energy storage	rGO/PU composite	3 kW m ⁻² solar light	110	310
	BP/eicosane/PMMA composite	simulated solar light	40	311
	PVP-MoSe ₂ /PNIPAM hydrogel	2.5 W cm ⁻² 808 nm NIR light	53	313
Smart hydrogel	MXene/PNIPAM hydrogel	0.8 W 808 nm NIR light	48	314
	PVA/MoS ₂ hydrogel	0.5 W cm ⁻² 808 nm NIR light	48	316
Wearable heater	AgNP@MXene-PU composite	sunlight	49	320
	MXene/PET composite	780 nm NIR light	204	323
	MoS ₂ /Au nanocomposites	808 nm NIR light	60	325
Bacteria inhibiting	Ti ₃ C ₂ nanosheets	400 mW 808 nm NIR light	45	326
	chitosan-functionalized magnetic GO	2 W cm ⁻² 808 nm NIR light	40	327
	Ag@BP nanohybrids	0.8 W cm ⁻² 808 nm NIR light	48	332
Wound healing	rGO/PDA composite	simulated solar light	41	336
	BP/SF composite	808 nm NIR light	58	337