ADVANCED MATERIALS

Supporting Information

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Supporting Information

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Table S1. Symbols list (alphabetical order)

Symbol	Full name
a	surface area
∇T	temperature gradient
C_p	heat capacity
C_p	specific heat capacity
d_{HCS}	diameter of harvested cell sheet
d_{NIR}	diameter of NIR- exposed area
E_F	Fermi level
$f(E)$	the Fermi–Dirac distribution function
$g_V(E)$	density of state
H	enthalpy of liquid- vapor phase change
h	heat-transfer coefficient

H_e	heat of evaporation of the water
I	output current
I_{pd}	(light) power density
l	thickness
m	mass
m_w	mass of evaporated water
p	carrier concentration
P	output power
p_0	initial pressure rise
PF_{PTE}	PTE power factor
Q_{cond}	heat conduction
Q_{conv}	heat convection
Q_e	power density for evaporation of water
Q_i	incident light power density
Q_{PT}	heat for a photothermal effect
Q_{rad}	heat radiation
Q_{surr}	heat loss to the surrounding environment
R	resistance between the two electrodes
S_{PTE}	photothermoelectric Seebeck coefficient
S_{TE}	thermoelectric Seebeck coefficient
T	temperature
T_{max}	maximum temperature
T_{surr}	surrounding temperature of system
V	output voltage
β	isobaric volume expansion coefficient
Γ	Grüneisen parameter
ΔT	temperature difference
ΔT_{PT}	temperature increase by photothermal effect
Δv	difference in evaporation rates with and without light
ε	absorption coefficient
η_d	efficiency of cell detachment
η_{PT}	photothermal conversion efficiency
η_{PTE}	photothermoelectric efficiency
η_{PTW}	photothermal efficiency of water vaporization
η_{STE}	solar thermal efficiency
η_w	water evaporation efficiency
θ	dimensionless temperature ratio
θ_b	bending angle
κ	isothermal compressibility
λ_{abs}	maximum absorption wavelength
λ_{PT}	light wavelength for PT engineering
μ	carrier (Hall) mobility
μ_a	absorption coefficient of tissue
ρ	mass density
σ_e	electrical conductivity
τ_s	time constant

Table S2. Abbreviations list (alphabetical order)

Abbreviation	Full name
A	acceptor
ADSC	adipose- derived stem cell
AM	antimicrobial
APTES	(3-aminopropyl)triethoxysilane
AVT	average visible transmittance
f-BNNS	functionalized boron nitrogen nanosheet
BSM	black sesame melanin
BT	benzothiadiazole
CP	conjugated polymer
CPM	constant potential method
Croc	croconaine
Croc-c	2,5-bis[(4-carboxylic-piperidylamino)thiophenyl]-croconium
CS	cell sheet
CTE	coefficient of thermal expansion
CTGS	carbonized towel- gourd sponges
CV	cyclic voltammogram
CVD	chemical vapor deposition
Cy	cyanine
D	donor
DCB	1,2-dichlorobenzene
DCM	dichloromethane
DI	diimmonium salt
DMF	dimethylformamide
DOS	density of state
DOX	doxorubicin hydrochloride
DPP	diketopyrrolopyrrole
DPPT	poly{2,2′-[(2,5-bis(2-hexyldecyl)-3,6-dioxo-2,3,5,6-tetrahydropyrrolo[3,4-c]pyrrole-1,4-diyl)dithiophene]-5,5′-diyl-*alt*-thiophene-2,5-diyl}
DPPV	poly{2,2′-[(2,5-bis(2-hexyldecyl)-3,6-dioxo-2,3,5,6-tetrahydropyrrolo[3,4-*c*]pyrrole-1,4-diyl)dithiophene]-5,5′-diyl-*alt*-vinyle
DSPE-PEG2000	1,2-distearoyl-*sn*-glycero-3-phosphoethanolamine–*N*-[methoxy(polyethylene glycerol)-2000]
DSSC	dye-sensitized solar cell
DT	2,2′-bithiophene
DTP	4H-dithieno[3,2-*b*:2′,3′-*d*]pyrrole
EB	emeraldine base
EDOT	3,4-ethylenedioxythiophene
ES	emeraldine salt
EXIM	excited-state intramolecular motion

FDA	the U.S. Food and Drug Administration
FESEM	field emission scanning electron microscopy
FL	fluorescence
FLI	fluorescence imaging
GO	graphene oxide
ICG	indocyanine green
ICT	intramolecular charge transfer
IDI	isobutyl-substituted diimmonium borate
IPA	*N*,*N*,*N*′,*N*′- tetrakis[4- (diisobutylamino)phenyl]- 1,4-phenylenediamine
IR-780	2-[2-[2-chloro-3-[(1,3-dihydro-3,3-dimethyl-1-propyl-2H-indol-2-ylidene)ethylidene]-1-cyclohexen-1-yl]ethenyl]-3,3-dimethyl-1-propylindolium iodide
IR-820	2-[2-[2-chloro-3-[[1,3-dihydro-1,1-dimethyl-3-(4-sulfobutyl)-2H-benzo[e]indol-2-ylidene]-ethylidene]-1-cyclohexen-1-yl]-ethenyl]-1,1-dimethyl-3-(4-sulfobutyl)-1H-benzo[e]indolium hydroxide inner salt
IR-825	3-(4-carboxybenzyl)-2-((E)-2-((E)-3-((Z)-2-(3-(4-carboxybenzyl)-1,1-dimethyl-1,3-dihydro-2H-benzo[e]indol-2-ylidene)ethylidene)-2-chlorocyclohex-1-en-1-yl)vinyl)-1,1-dimethyl-1H-benzo[e]indol-3-ium bromide
ISC	intersystem crossing
ITO	indium tin oxide
LC	liquid crystal
LED	light emitting diode
mol-PT	molecular photothermal
Molecule (**1**)	l,l,2-trimethyl-lH-benzo[e]indole
Molecule (**2**)	4-(l,l,2-trimethyl-lH-benzo[e]indolium-3-yl)butane-l-sulfonate
Molecule (**3**)	N-phenyl-N-((lE,3E,5E)-5-(phenylimino)penta-l,3-dienyl)acetamide triethyl amine
Monomer (**4**)	3,6-bis(5-bromothiophene-2-yl)-2,5-bis(2-hexyldecyl)pyrrolo[3,4-*c*]pyrrole-1,4(2*H*,5*H*)-dione
Monomer (**5**)	*trans*-1,2-bis(tributylstannyl)ethene
Monomer (**6**)	dibromo-thiophene-fused benzodifurandione-based oligo(p-phenylenevinylene)
Monomer (**7**)	2-(trimethylstannyl)-5-(5-(trimethylstannyl)thiophen-2-yl)thiophene
Monomer (**8**)	terephthalonitrile
Monomer (**9**)	2,5-diaminobenzene-1,4-dithiol
MW	microwave
MXene	$Ti_3C_2T_x$, where T is a functional group (e.g. O, F, OH, Cl)
NIR	near infrared
NP	nanoparticle
NRD	nonradiative decay
P3HT	poly(3-hexylthiophene)
PANI	polyaniline

PA	photoacoustic
PAI	photoacoustic imaging
PAT	photoacoustic therapy
PATo	photoacoustic tomography
PCE	photothermal conversion efficiency
PCL	polycaprolactone
PCPDTBSe	poly[4,4-bis(2-ethylhexyl)-cyclopenta[2,1-b;3,4-b']dithiophene-2,6-diyl-*alt*-2,1,3-benzoselenadiazole-4,7-diyl]
PCPDTBT	poly[2,6-(4,4-bis-(2-ethylhexyl)-4H-cyclopenta[2,1-b;3,4-b′]dithiophene)-*alt*-4,7(2,1,3-benzothiadiazole)]
PDA	polydopamine
PDMS	poly(dimethylsiloxane)
PDPPTDQ	poly{2,2'-[(2,5-bis(2-ethylhexyl)-3,6-dioxo-2,3,5,6-tetrahydropyrrolo[3,4-c]pyrrole-1,4-diyl)dithiophene]-5,5'-diyl-*alt*-[6,7(4-hexylphenyl)-[1,2,5]thiadiazolo[3,4-g]quinoxaline]}
PDPPTh	poly[diketopyrrolopyrrole-*alt*-thiophene]
PDPTBT	poly(7-pentadecane-4H-dithieno[3,2-b:2′,3′-d]pyrrole-*alt*-2,1,3-benzothiadiazole)
PDPTDPP	poly[7-pentadecane-4H-dithieno[3,2-b:2′,3′-d]pyrrole-*alt*-2,5-bis(2-octyldodecyl)-3,6-di(thiophen-2-yl)pyrrolo[3,4-c]pyrrole-1,4(2H,5H)-dione)]
PDPTPT	poly(7-pentadecane-4H-dithieno[3,2-b:2′,3′-d]pyrrole-*alt*-1,2,5-thiadiazolo[3,4-c]pyridine)
PDT	photodynamic therapy
PE	piezoelectric
PEDOS	poly(3,4-ethylenedioxyselenophene)
PEDOS-C6	hexyl-derivatized poly(3,4-ethylenedioxyselenophene)
PEDOT	poly(3,4-ethylenedioxythiophene)
PEDOT-S	propane- 1- sulfonated poly(3,4-ethylenedioxythiophene)
PEDOT:PSS	polystyrene sulfonate doped poly(3,4-ethylenedioxythiophene)
PEPG	poly(ethylene glycol)-*block*-poly(propylene glycol)-*block*-poly(ethylene glycol)
PES	polyethersulfone
PET	polyethylene terephthalate
PETo	positron emission tomography
PF	NIR-blocking plastic filter
PFBT	poly(9,9-dihexylfluorene-*alt*-2,1,3-benzothiadiazole)
PFTTQ	poly[9,9-bis(4-(2-ethylhexyl)phenyl)-fluorene-*alt*-*co*-6,7-bis(4-(hexyloxy)phenyl)-4,9-di-(thiophen-2-yl)thiadiazoloquinoxaline]
PM	photo-mechanical
PMMA	poly(methyl methacrylate)
PNIPAM	poly(N-isopropylacrylamide)
pol-PT	polymeric photothermal
Poly[Cu_x(Cu-ett)]	poly[Cu_x(Cu-ethylenetetrathiolate)]

Poly(EDOT-HQ-co-EDOT-PC)	hydroquinone and phosphorylcholine functionalized PEDOT copolymer
PorCP	porphyrin-based conjugated polymer
PorCP2	poly([(5,15- diethynyl- 10,20- bis(3,5- bis(octyloxy)phenyl) porphyrinato]zinc- alt- (2,1,3- benzothiadiazole))
PPBBT	poly(2-phenyl-benzobisthiazole)
PProDOS	poly(3,4-propylenedioxyselenophene)
PPy	polypyrrole
PS	polystyrene
PT	photothermal
PTA	photothermal actuator
PTCS	photothermal cell sheet harvesting
PTE	photothermoelectric
PTH	photothermal heater
PTHC	photothermal harvesting of cells
PTII	poly(thienoisoindigo)
PTSC	photothermal single cell harvesting
PTT	photothermal therapy
PTW	photothermal water evaporation
PU	polyurethane
PV	photovoltaic
PVA	polyvinyl alcohol
PVDF	poly(vinylidene fluoride)
PVDF-TrFE	poly(vinylidene fluoride-*co*-trifluoroethylene)
PVPS	poly(vinylpyrrolidone) sulfobetaine
RGO	reduced graphene oxide
ROS	releases singlet oxygen
SC	single cell
SCP	solution casting polymerization
SE	Stirling engine
SEM	scanning electron microscopy
SPR	surface plasmon resonance
SS	stainless steel
STE	solar thermal efficiency
TBDOPV	thiophene-fused benzodifurandione-based oligo(p-phenylenevinylene)
TBDOPV-DT	thiophene-fused benzodifurandione-based oligo(p-phenylenevinylene)-2,2′-bithiophene
TE	thermoelectric
Tos	tosylate
TzQI-TDPP	poly(thiadiazoloquinoxalinimide-thiophene-flanked diketopyrrolopyrrole)
UV	ultraviolet

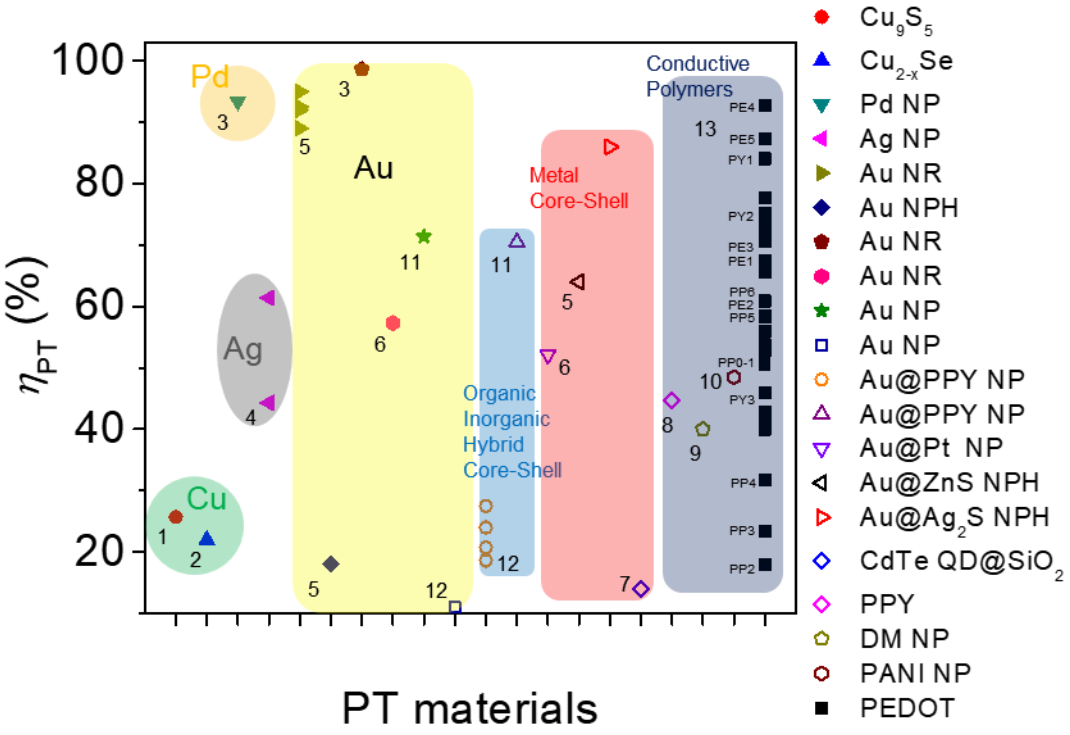

Figure S1. Photothermal conversion efficiency of various photothermal materials including metals, conductive polymers, and organic-inorganic hybrid materials. NP: nanoparticle, NR: nanorod, NPH: nanopolyhedron, PPY: polypyrrole, QD: quantum dot, DM: dopamine melanin, PANI: polyaniline. The number near the data point is the reference number of the sample.[1-13]

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