Supporting Information

Oxidation-resistant hybrid metal oxide/metal nanodots/silver nanowires for high performance flexible transparent heaters

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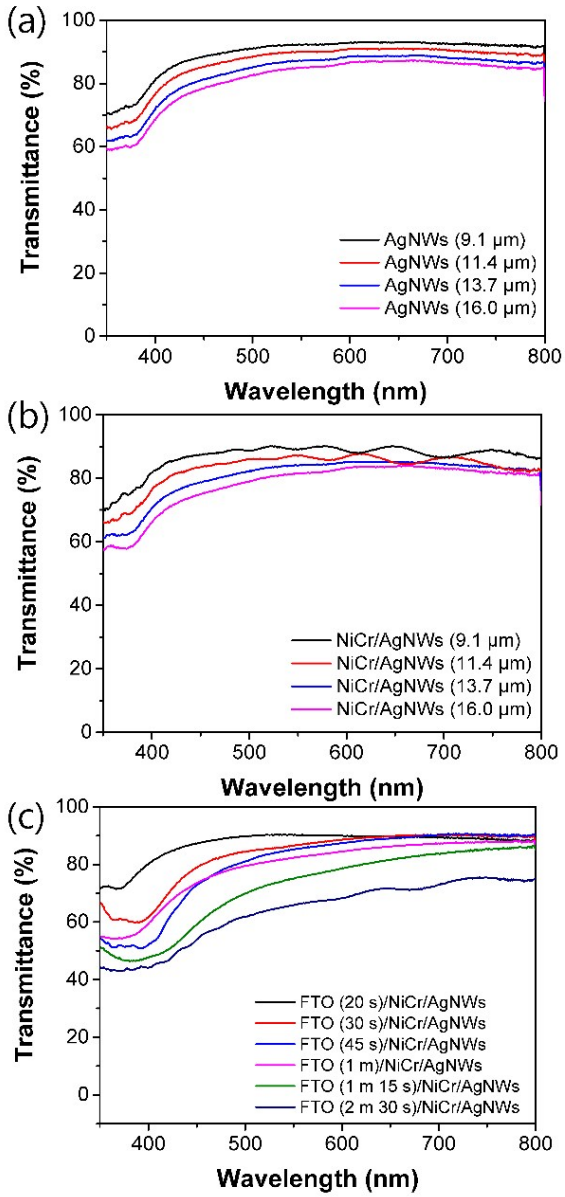

Fig. S1 Visible optical transmittance spectra in the wavelength range of 300 to 800 nm for (a) AgNWs with different coating thicknesses, (b) NiCr-coated AgNWs with different thicknesses, and (c) FTO/NiCr/AgNW hybrid transparent heaters with different deposition times.

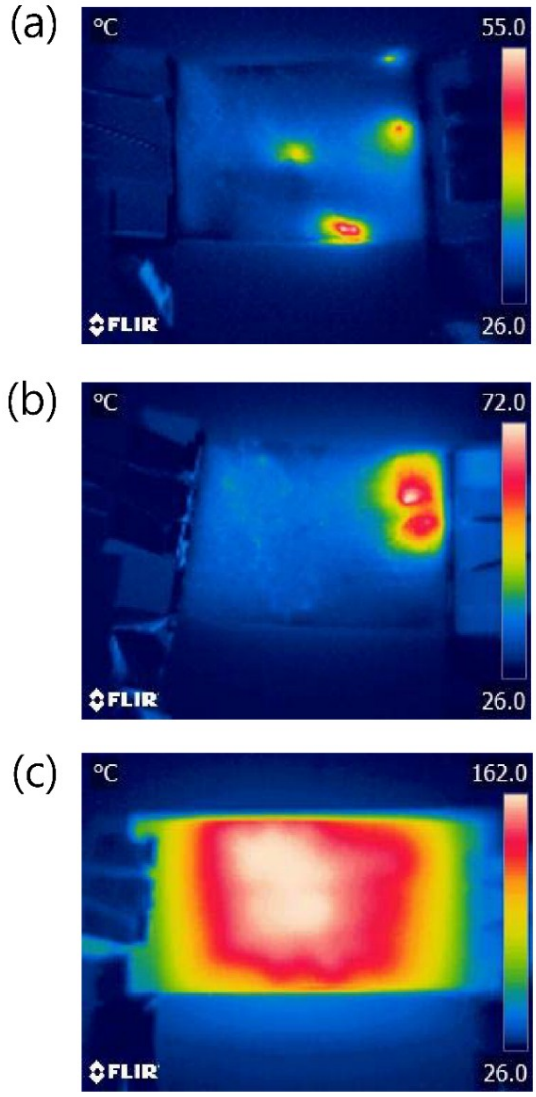

Fig. S2 Infrared images of (a) AgNWs, (b) NiCr/AgNWs, and (c) FTO/NiCr/AgNW hybrid transparent heaters.

Table S1 Optimization of transmittance at 550 nm, sheet resistance, and figure of merit of hybrid transparent heaters.

	Transmittance at 550 nm (%)	Sheet resistance (Ω sq^{-1})	Figure of merit ($\times10^{-2}$ Ω^{-1})
AgNWs (9μm)	92.18	35	1.2656
AgNWs (11μm)	89.92	26	1.3291
AgNWs (13μm)	87.09	15	1.6733
AgNWs (16μm)	84.92	10	1.9503
NiCr/AgNWs (9μm)	88.87	20	1.5364
NiCr/AgNWs (11μm)	86.98	14	1.7703
NiCr/AgNWs (13μm)	83.91	10	1.7303
NiCr/AgNWs (16μm)	81.15	7	1.7692
FTO (20 s)/NiCr/AgNWs (11μm)	90.17	10	3.5532
FTO (30 s)/NiCr/AgNWs (11μm)	86.55	10	2.3586
FTO (45 s)/NiCr/AgNWs (11μm)	85.07	10	1.9850
FTO (60 s)/NiCr/AgNWs (11μm)	82.25	10	1.4169
FTO (75 s)/NiCr/AgNWs (11μm)	75.05	10	0.5669
FTO (150 s)/NiCr/AgNWs (11μm)	65.83	10	0.1528

Table S2 Comparison of heating rates of various transparent heaters in the literatures.

	Voltage (V)	Steady-state temperature (°C)	Response time (sec.)	Normalized heating rate ($°C\ V^{-1}s^{-1}$)	Ref.
Graphene film	60	200	30	0.116	[15]
SWCNT[a]	12	95	60	0.132	[10]
rLGO[b]/AgNWs[c]	10	80	150	0.053	[21]
AgNWs/polymer composite	9	134	30	0.496	[22]
AgNWs network	7	100	60	0.238	[17]
AgNWs random network	7	55	200	0.039	[19]
AgNWs/PEDOT:PSS[d]	6	110	25	0.733	[24]
AgNWs/PI TFHs[e]	6	96	40	0.400	[26]
AgNWs	6	51	20	0.425	This work
NiCr/AgNWs	6	72	20	0.600	This work
FTO/NiCr/AgNWs	6	162	20	1.350	This work

[a]SWCNT: single-wall carbon nanotube; [b]rLGO: reduced-large size graphene oxide; [c]AgNWs: silver nanowires; [d]PEDOT:PSS: poly(3,4-ethylenedioxythiophene)-polystyrene sulfonate; [e]PI TFHs: polyimide transparent film heaters.