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RESEARCH ARTICLE

Sn doping induced n-type to p-type transition in Bi_2Se_3 nanosheets for flexible temperature sensing

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Supporting Information

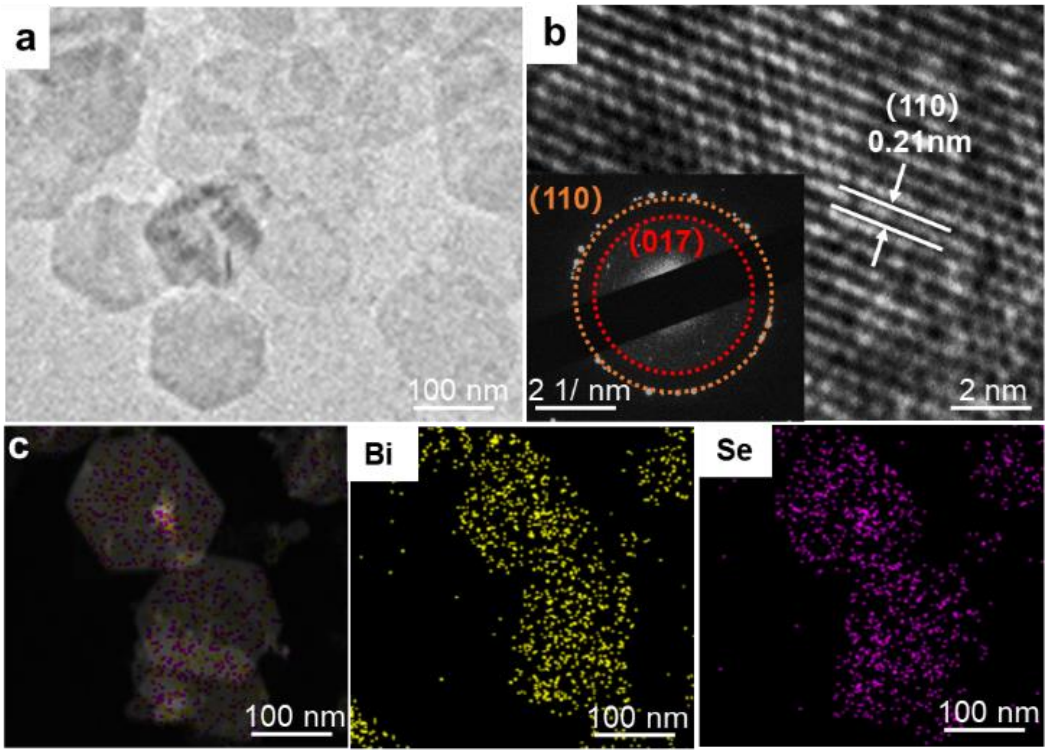

Fig. S1 (a) TEM image of Bi_2Se_3. **(b)** HR-TEM image of Bi_2Se_3, insert show the electron diffraction ring. **(c)** EDS mapping result of Bi_2Se_3.

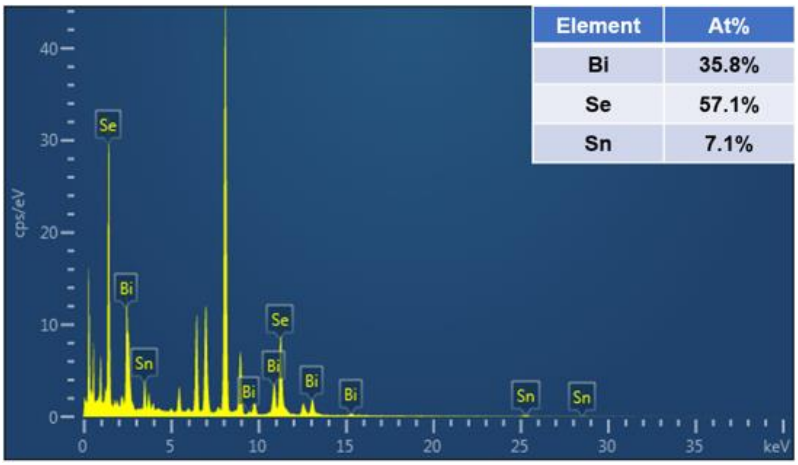

Fig. S2 EDX spectrum of Bi, Se and Sn elements in $Bi_{1.97}Sn_{0.03}Se_3$ nanosheets.

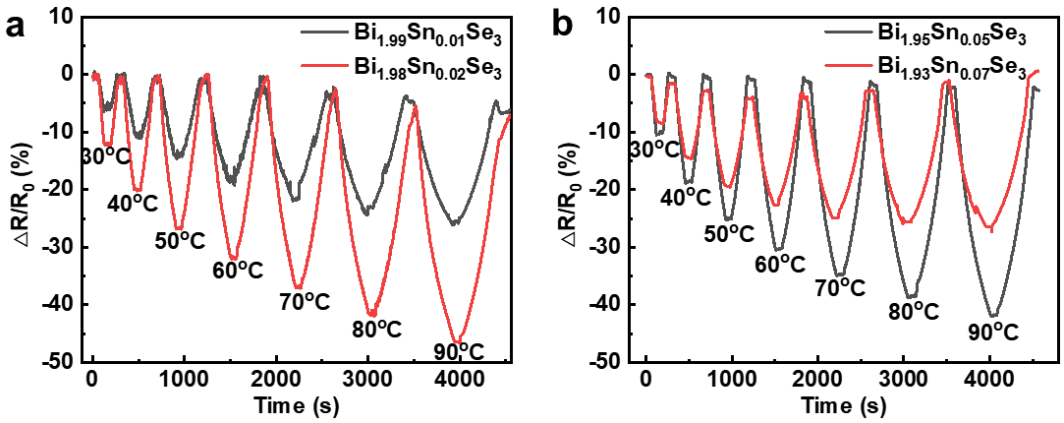

Fig. S3 Dynamic response-recovery curves of the temperature sensors based on $Bi_{2-x}Sn_xSe_3$/PEDOT:PSS (x = 0.01, 0.02, 0.05, 0.07) in the temperature range of 20-90 °C.

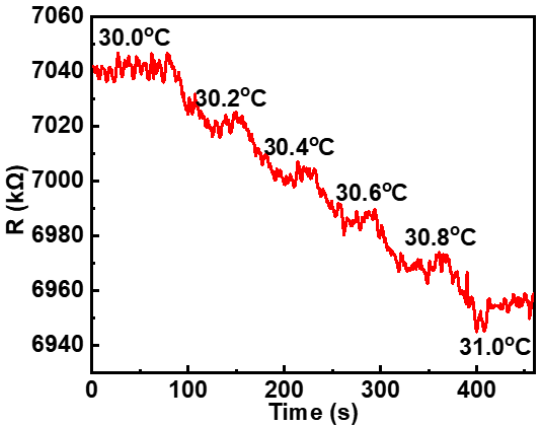

Fig. S4 The resistance variation in $Bi_{1.97}Sn_{0.03}Se_3$-based temperature sensor upon the temperature changes from 30.0 °C to 31.0 °C at the increments of 0.2 °C.

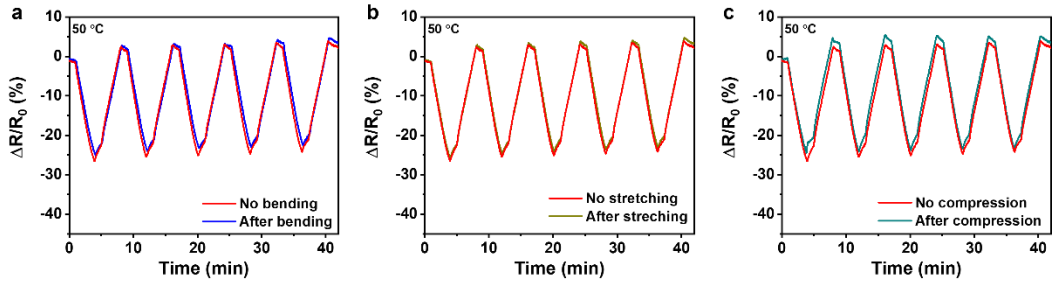

Fig. S5 Repeatability tests of $Bi_{1.97}Sn_{0.3}Se_3$/PEDOT:PSS based temperature sensor during five consecutive heating and cooling cycles at 20-50 °C before/after **(a)** being bent 300 times, **(b)** stretched and **(c)** compressed by 5 N stress.

Table S1 Comparison of the sensing properties of various temperature sensors.

Material	TCR (%/°C)	Working range (°C)	Ref.
$Bi_{1.97}Sn_{0.03}Se_3$/PEDOT:PSS	-0.63	30-90	This work
PEDOT:PSS	0.18	25-60	[1]
rGO	0.37	30-100	[2]
Ag-MWCNTs/PEDOT:PSS	-0.45	25-80	[3]
CNT/PEDOT:PSS	-0.31	25-50	[4]
CuPc/PEDOT:PSS	0.1940	20-80	[5]
Graphene/PEDOT: PSS	0.06	35-45	[6]
GO and PLA composite	-0.285	25-45	[7]
PVC/CB	-0.148	18-44	[8]

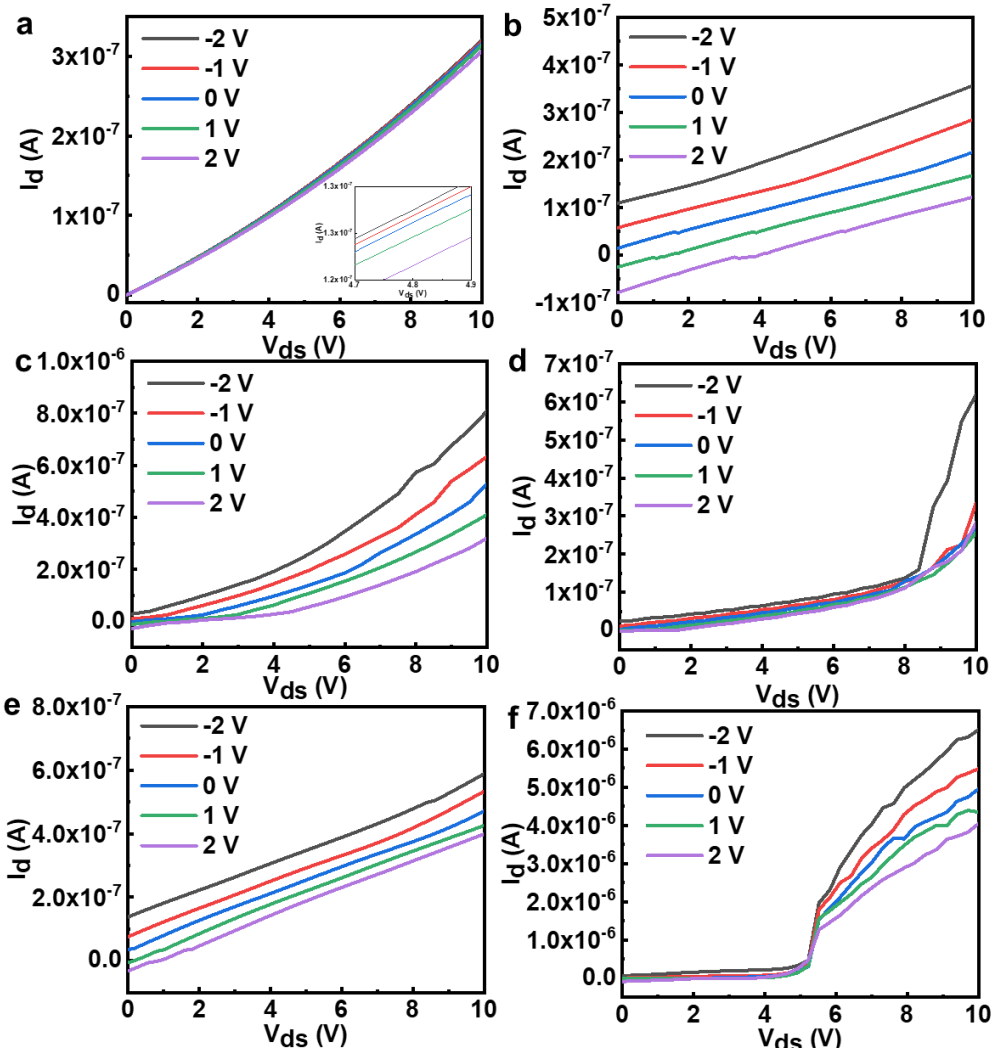

Fig. S6 I_{ds}-V_{ds} curves of **(a)** $Bi_{1.99}Sn_{0.01}Se_3$, **(b)** $Bi_{1.98}Sn_{0.02}Se_3$, **(c)** $Bi_{1.95}Sn_{0.05}Se_3$, **(d)** $Bi_{1.99}Sn_{0.01}Se_3$/PEDOT:PSS, **(e)** $Bi_{1.98}Sn_{0.02}Se_3$/PEDOT:PSS and **(f)** $Bi_{1.95}Sn_{0.05}Se_3$/PEDOT:PSS at different gate voltages.

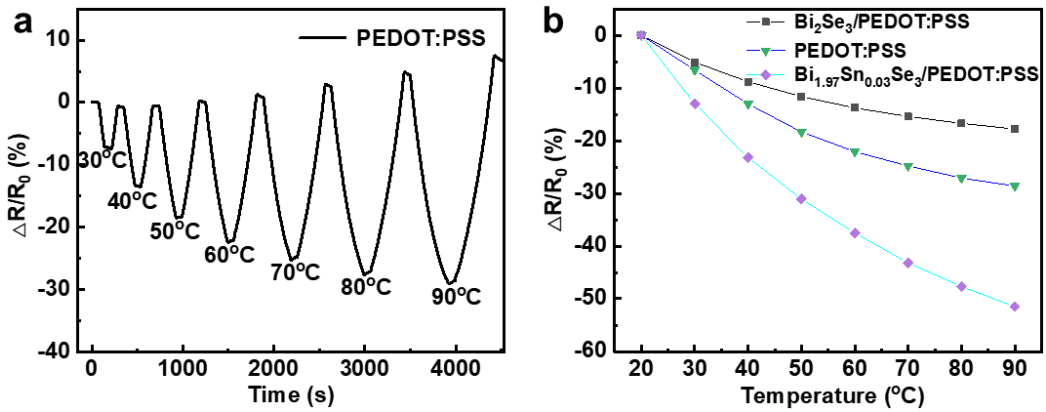

Fig. S7 (a) Dynamic response-recovery curve of PEDOT:PSS-based temperature sensor in the temperature range of 20-90 ℃. **(b)** Comparison of the response ($\Delta R/R_0$) of temperature sensors based on PEDOT:PSS, Bi_2Se_3/PEDOT:PSS and $Bi_{2-x}Sn_xSe_3$/PEDOT: PSS.

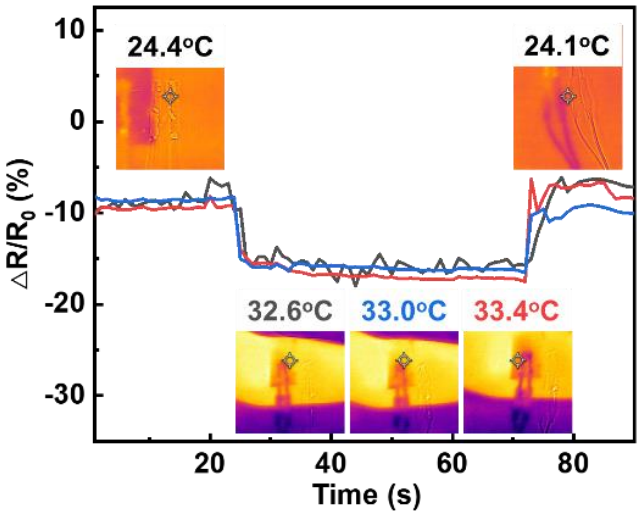

Fig. S8 The response-recovery curves of $Bi_{1.97}Sn_{0.03}Se_3$-based flexible temperature sensor in detecting different arm temperatures of 32.6 ℃, 33.0 ℃ and 33.4 ℃ with measured data with gray, blue and red line and the corresponding temperature images captured by the infrared thermometer.

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