Supplementary Material

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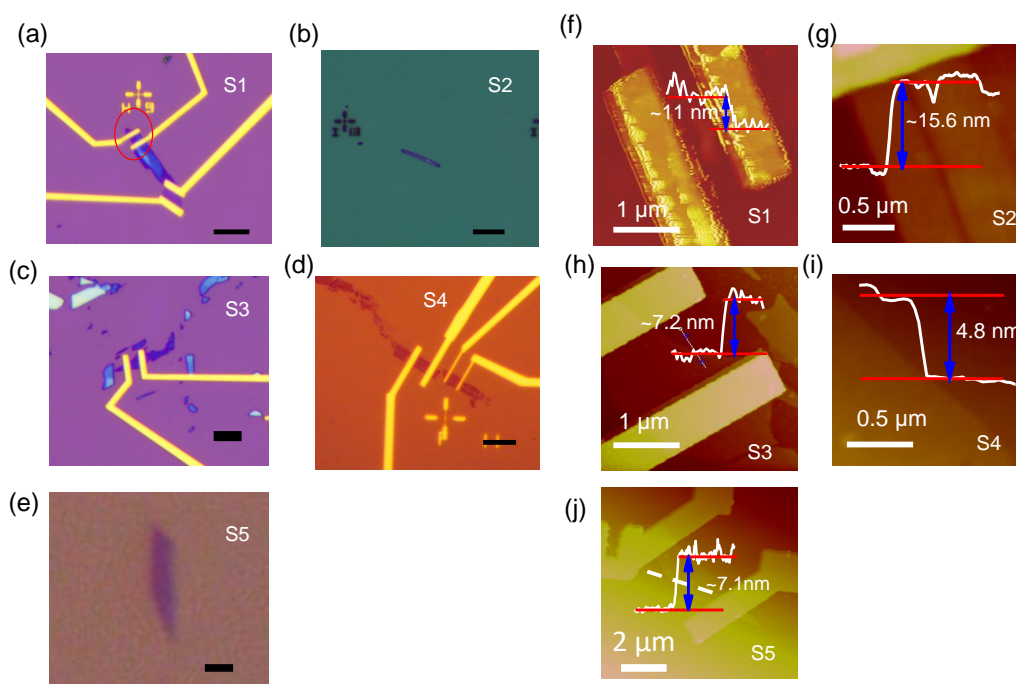
I. DEVICE CHARACTERIZATION

Fig. S1: Optical image of different 1T′-MoTe$_2$ nanocrystals with varying thickness (a) Sample S1, with thickness ∼11 nm. (b) Sample S2, with thickness ∼16 nm. (c) Sample S3, with thickness ∼7 nm, and (d) Sample S4, with thickness ∼5nm. (e) (d) Sample S5, with thickness ∼7nm. (f)-(i) AFM image of S1, S2, S3, S4 and S5. Inset shows their height profile.

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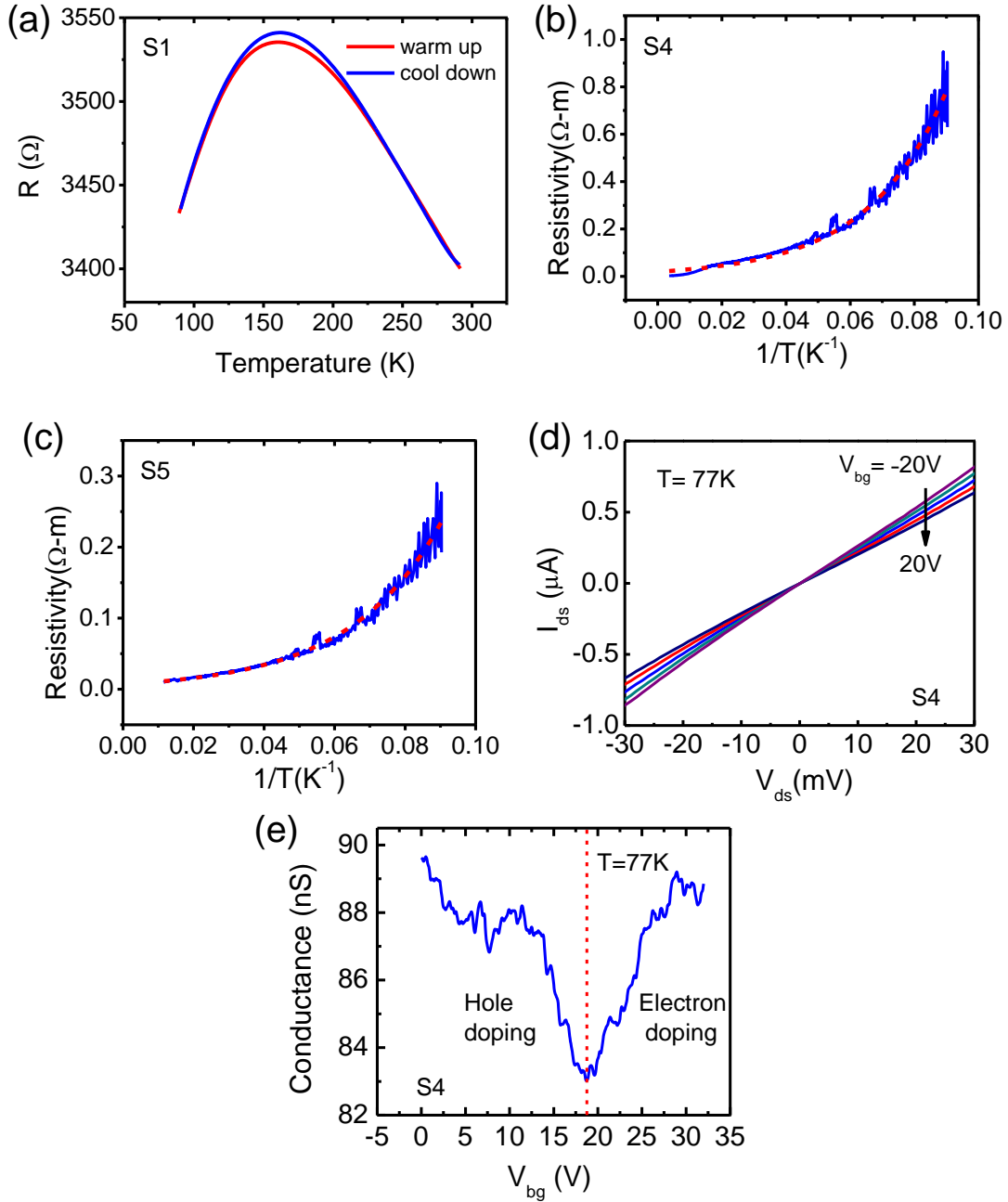
II. ADDITIONAL TRANSPORT DATA

Fig. S2: (a) Resistance versus temperature plot for warming up and cooling down for 11nm nanocrystal. Resistivity versus temperature data (blue line) fit with Arrhenius equation (red dotted line) for (b) 5nm and (c) 7nm nanocrystals respectively. (d) Drain current (I_{ds}) with drain voltage (V_{ds}) plot for five different gate voltages of 5nm nanocrystal at 77K temperature. (e) Conductance of 5nm device plot with back gate voltage (V_{bg}) at 77K. Dotted red line indicates V_{bg} for minimum conductance separating electron and hole dominated drain current.
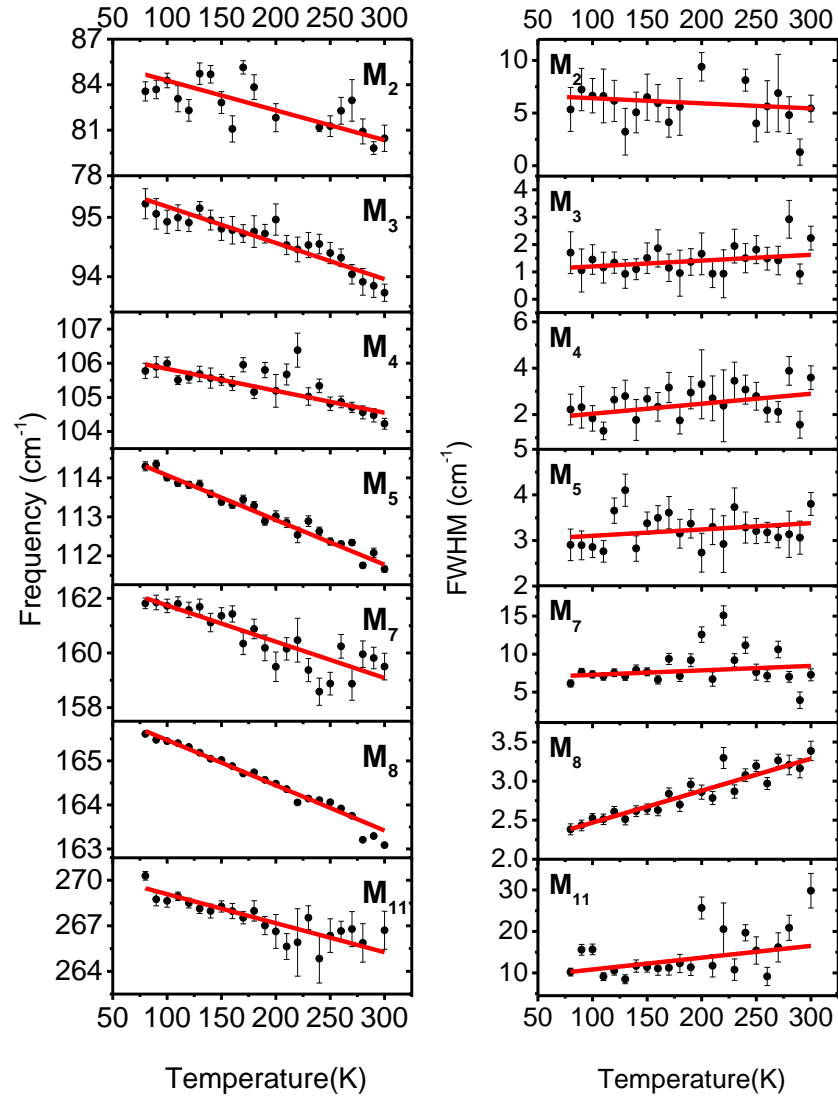
III.   ADDITIONAL RAMAN DATA

Fig. S3: Variation of (a) Frequency and (b) FWHM with temperature of M_2, M_3, M_4, M_5, M_7, M_8 and M_{11} mode. Red lines shows their respective cubic anharmonic fitting.

TABLE S1: Calculated value of the cubic anharmonic coefficients and electron-phonon coupling term

Coefficients (cm^{-1})	M_1	M_6	M_9	M_{10}
A	0	0.4±0.1	1.1±0.8	3.5±0.8
B	0	1.1 ±0.7	1.5±0.6	12.0±4.5
C	1.07±0.4	0	5.1±1.7	3.5±1.3
D	4.1±1.3	3.9±1.2	6.9±1.9	27.0±7.9