

Supplementary Information

Insights into the Multifunctional Applications of Strategical Co doped MoS₂ Nanoflakes

R. Rahman¹, S. Chowdhury¹, D. Samanta², A. Pathak² and T. K. Nath*¹

¹Department of Physics, Indian Institute of Technology Kharagpur, West Bengal 721302, India

²Department of Chemistry, Indian Institute of Technology Kharagpur, West Bengal 721302, India

S1 XRD data analysis

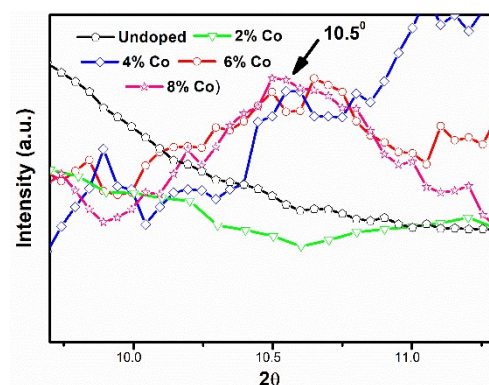


Fig. S1 Magnified image of XRD plot indicating evolution of 1T phase in 2H phase MoS₂ with increase in Co doping.

S2. VSM data

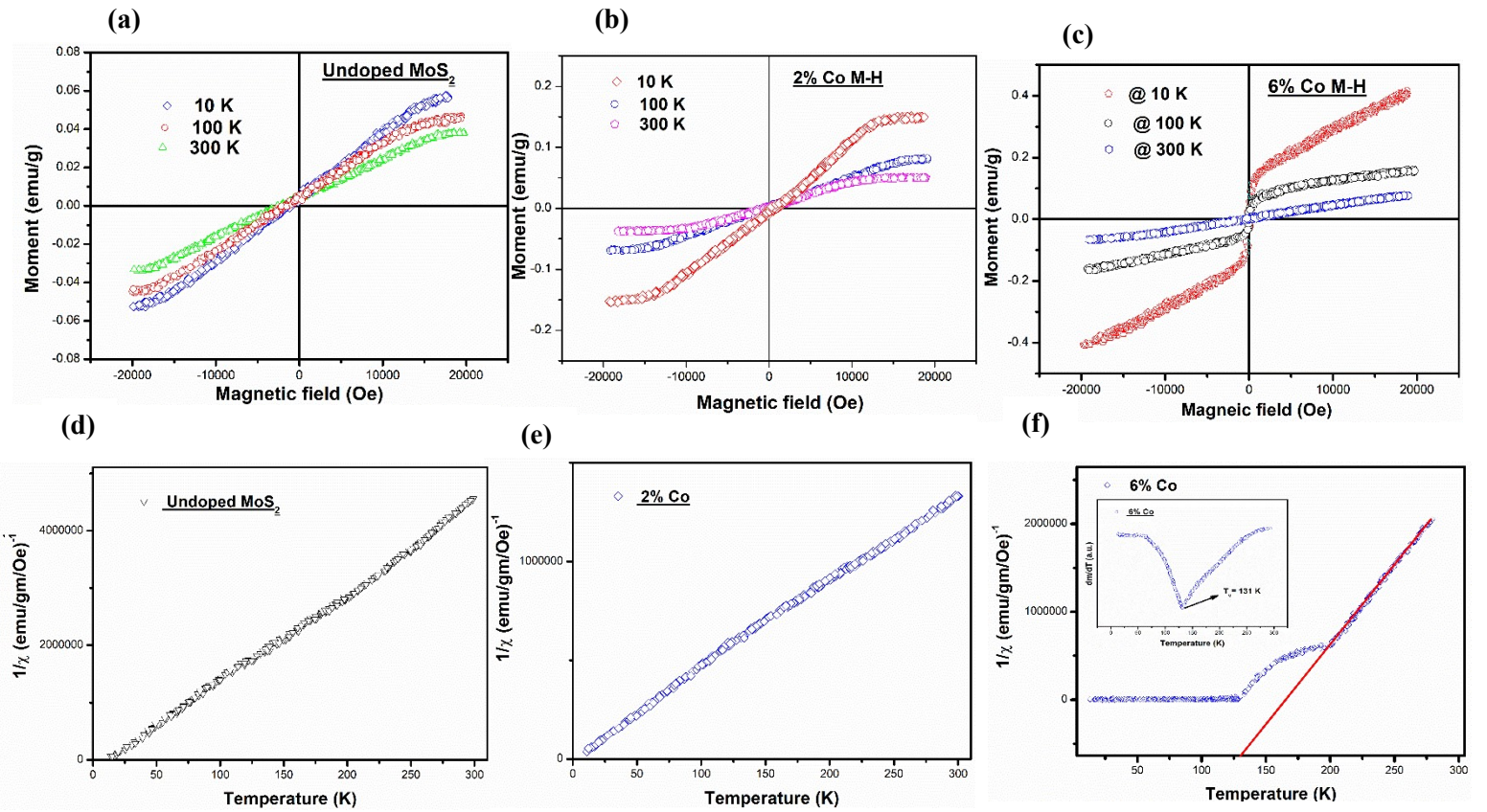


Fig. S2 M vs H hysteresis loop of (a) undoped MoS₂, (b) 2% Co, (c) 6% Co at 10K, 100 K and 300 K within applied magnetic field range of -2T to 2 T. (d), (e), (f) represent 1/χ vs T plot corresponding to undoped, 2% Co doped MoS₂ (paramagnetic nature) and 6% Co doped MoS₂ (ferromagnetic nature); inset of (f) shows minima of dm/dT plot indicating T_c of 6% Co doped MoS₂ NFs at 131 K.

S3 Theoretical result

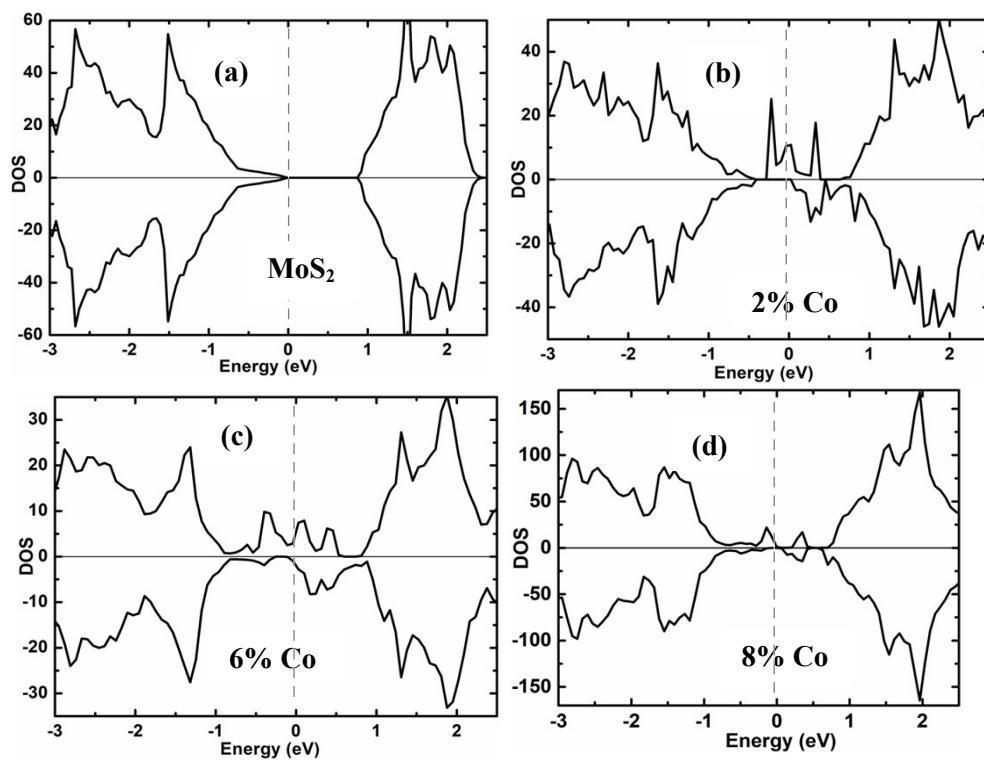


Fig. S3 Total density of states (TDOS) of (a) undoped MoS₂ supercell; (b) the supercell with 2% Co dopant; (c) the supercell with 6% Co and (d) the supercell with 8% Co dopant atom (the vertical dashed line indicates the Fermi level).

S4 Electrochemical analysis

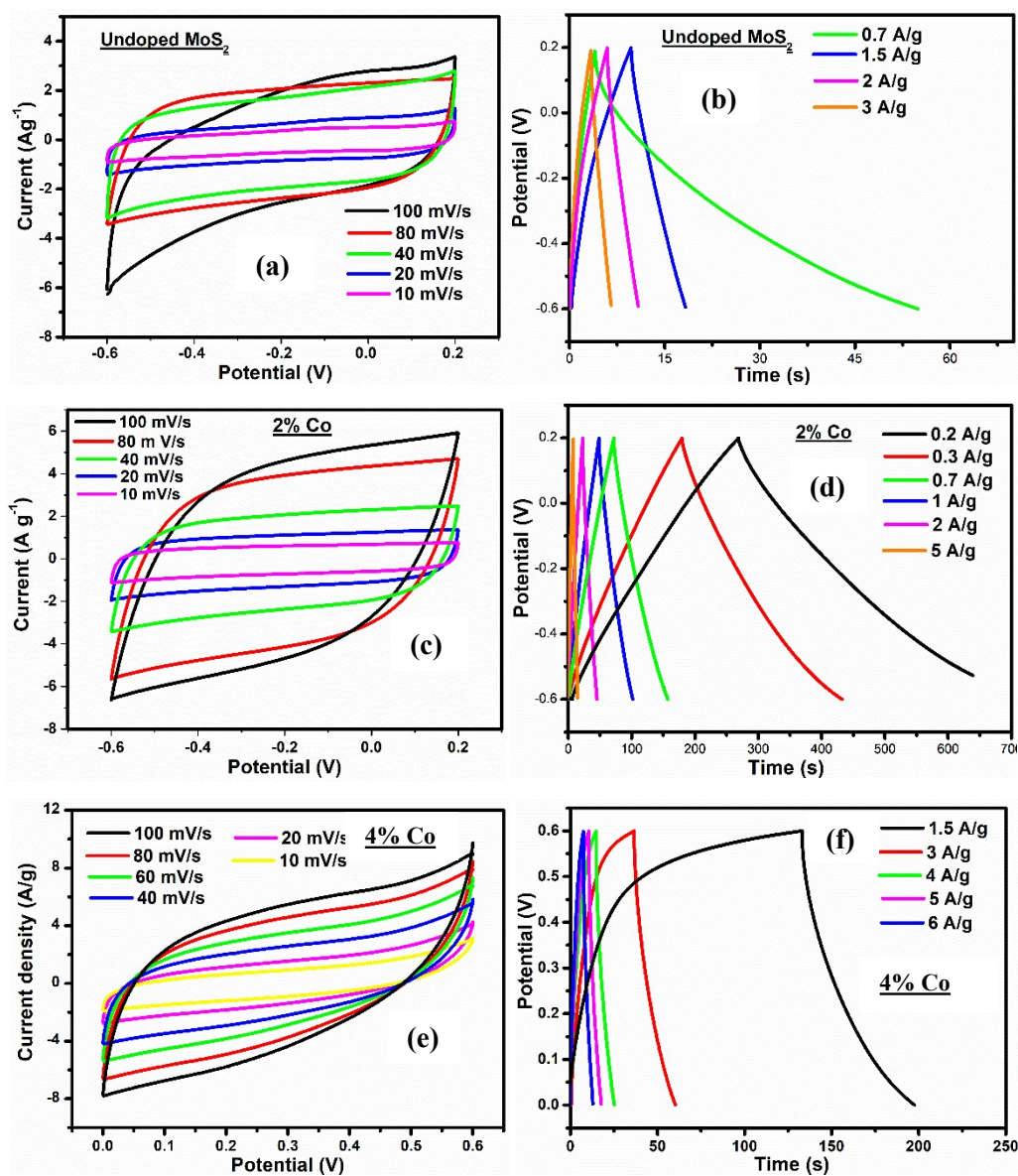


Fig. S4 Left panel shows the CV curves of (a) undoped, (c) 2% Co (e) 4% Co doped MoS₂ at different scan rates; Right panel shows the GCD profile of (b) undoped MoS₂ and (d) 2% Co doped (f) 4% Co doped MoS₂ at different current densities.

Table S1 Specific capacitance (C_{sp}) values at different scan rates for undoped, 2% Co, 4% Co and 8% Co doped MoS₂ (From CV plots)

Scan rate (mV/s)	C_{sp} (MoS ₂) (F/g)	C_{sp} (2% Co) (F/g)	C_{sp} (4% Co) (F/g)	C_{sp} (8% Co) (F/g)
100	41.4	71.4	79.3	102.2
80	58.1	82.3	85.2	114.02
60	66.8	88.4	89.44	128.7
40	72.5	98.3	102.08	148.8
20	85.9	111.2	127.5	180.5
10	98.1	123.8	162.8	217.9

Table S2 Time of discharge current values and specific capacitance at different current densities for undoped, 2% Co, 4% Co and 8% Co-doped MoS₂

Undoped			2% Co			4% Co			8% Co		
Current density (A/g)	Δt (sec)	C_{sp} (F/g)	Current density (A/g)	Δt (sec)	C_{sp} (F/g)	Current density (A/g)	Δt (sec)	C_{sp} (F/g)	Current density (A/g)	Δt (sec)	C_{sp} (F/g)
0.7	51	59.5	0.7	85	99.1	1.5	64	162.5	1.5	187	201.4
1.5	12	18	1	53	88.3	3	23	115	3	82	173.6
2	6	15	2	22	73.3	4	11	66.7	4	48	137.1
3	3	11.3	5	5	41.6	5	8	58.3	6	29	124.3
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