

## Supporting Information

### Tuning of Structural and Optical Properties with Enhanced Catalytic Activity in Chemically Synthesized Co-Doped MoS<sub>2</sub> Nanosheets

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#### 1. AFM Image Analysis

The films of undoped and 6% Co doped MoS<sub>2</sub> were deposited on SiO<sub>2</sub>/Si substrate by spin coating (3000 rpm, 1 min) and the images of the film were recorded in non-contact mode. The lateral dimension of each particle is 0.15 μm and 0.05 μm of undoped and 6% Co doped MoS<sub>2</sub>, respectively as obtained from height profile distribution curve.

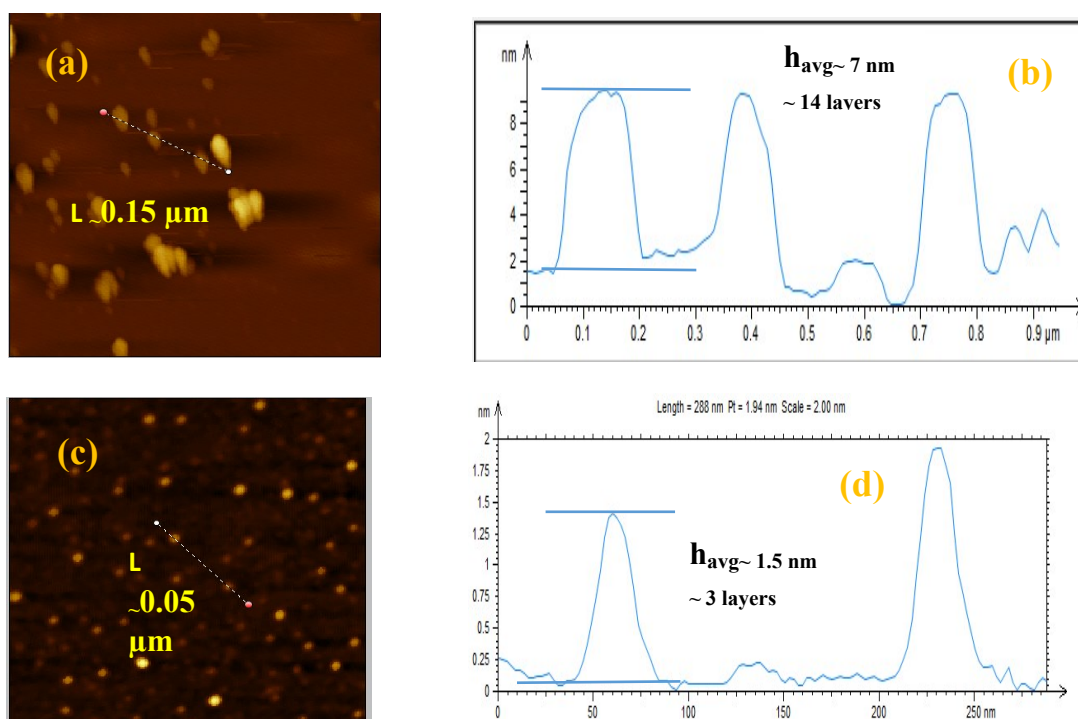
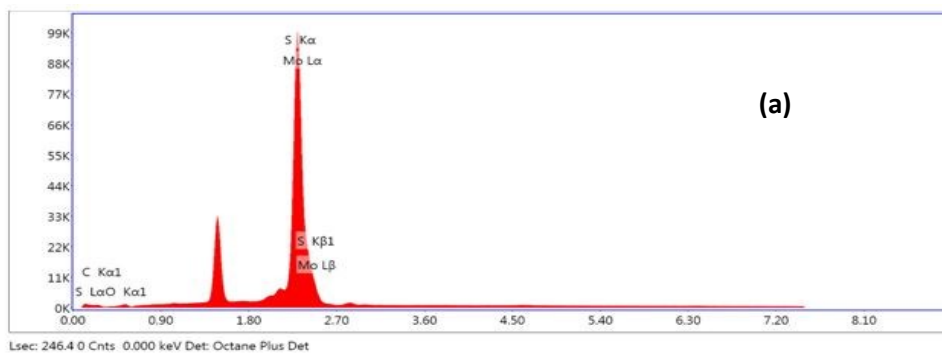
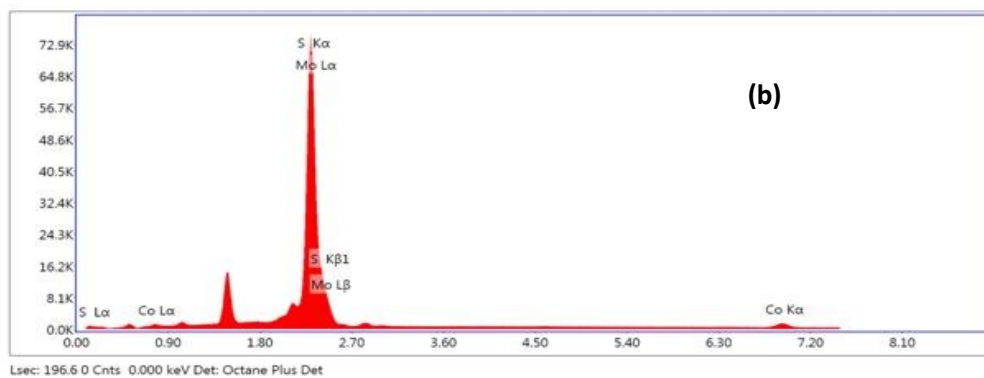


Figure S1: Tapping mode (a), (c); (b), (d) height profile distribution of undoped and 6% Co doped MoS<sub>2</sub> in AFM



**eZAF Smart Quant Results**

Element	Weight %	Atomic %	Net Int.	Error %	Kratio	Z	R	A	F
C K	4.96	20.46	35.7	11.82	0.01	1.37	0.81	0.10	1.00
O K	0.14	0.43	2.4	64.35	0.00	1.31	0.84	0.13	1.00
MoL	65.59	33.85	3836.9	2.05	0.62	0.90	1.07	1.04	1.01
S K	29.30	45.25	3430	2.39	0.32	1.17	0.92	0.92	1.01



**eZAF Smart Quant Results**

Element	Weight %	Atomic %	Net Int.	Error %	Kratio	Z	R	A	F
MoL	66.03	41.32	3878.5	1.77	0.63	0.92	1.06	1.02	1.01
S K	28.20	52.80	2960.7	2.67	0.28	1.21	0.90	0.90	1.01
CoK	5.76	5.87	179.1	5.56	0.09	1.03	0.98	0.97	1.07

Figure S2: EDX spectrum of (a) undoped, (b) 6% Co doped MoS<sub>2</sub> nanosheets.

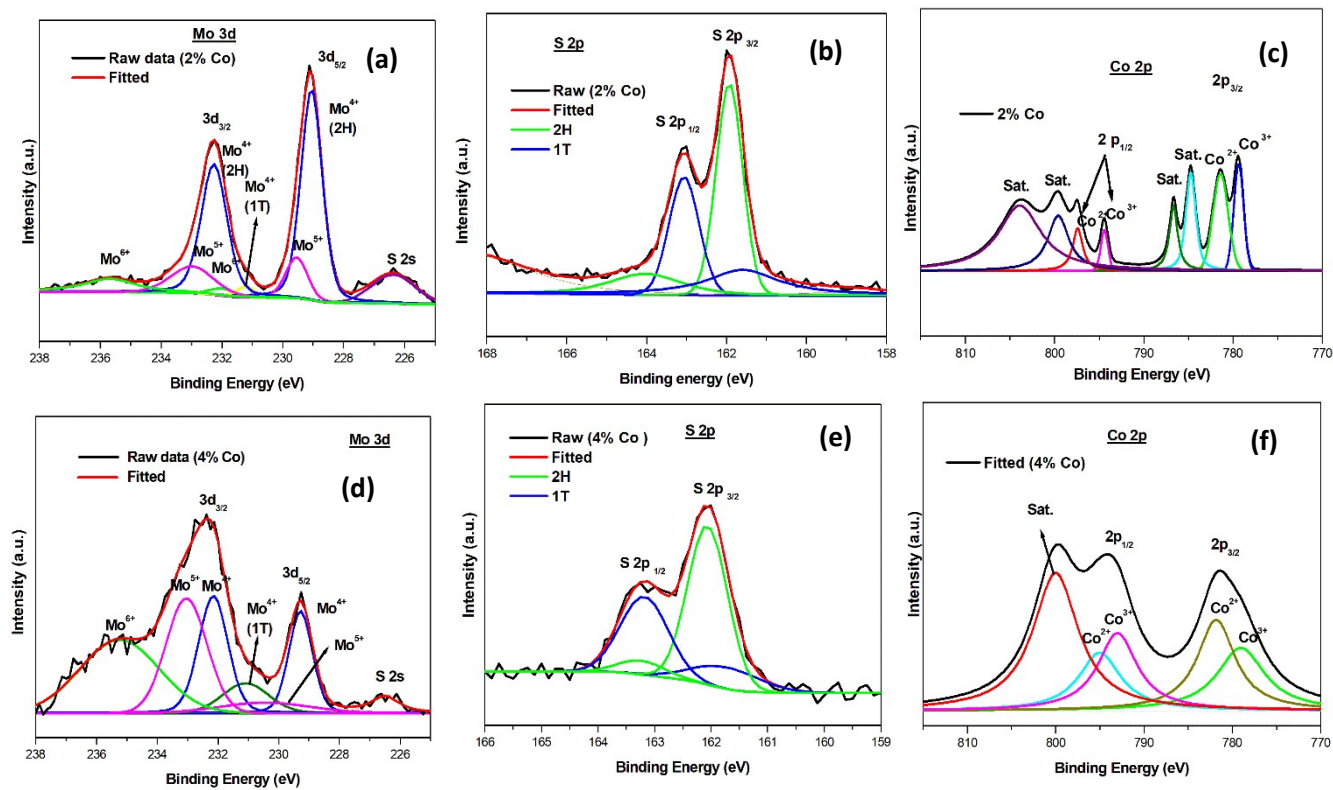


Figure S3: XPS narrow scan spectra of Mo 3d (a), (d) and S 2p (b), (e), for 2% Co and 4% Co doped MoS<sub>2</sub>. Narrow scan spectra of Co 2p (c), (f) of 2% and 4% Co doped MoS<sub>2</sub>.