Supplementary Material

Device simulation of layer dependence on 10-nm-gate MoS_2 transistors

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Table S1. Device performances for *n*- and *p*-type 10-nm-gate MoS_2 MOSFETs with 1 to 3 layers under various doping concentrations at V_{dd} = 0.5 V. The IRDS LP and HP targets for “5am eq” node (2023 version) are given for comparison. Here, $N_{s/d}$: source/drain doping concentration; I_{off}: off-state current; I_{on}: on-state current; SS: subthreshold swing; g_m: transconductance; C_g: intrinsic gate capacitance (excluding parasitic capacitances); τ: delay time; and PDP: power dissipation.

type	layer	$N_{s/d}$ (cm^{-2})	I_{off} (μA/μm)	I_{on} (μA/μm)	SS (mV/dec)	g_m (mS/μm)	C_g (fF/μm)	τ (ps)	PDP (fJ/μm)
n-type	ML	6×10^{13}	10^{-4}	170	58	1.03	0.26	2.25	0.19
	ML	1×10^{14}	10^{-4}	312	54	1.97	0.24	1.17	0.18
	BL	1×10^{13}	10^{-4}	398	56	2.20	0.21	0.80	0.16
	BL	1×10^{14}	10^{-4}	261	57	5.72	0.29	1.65	0.21
p-type	ML	1×10^{13}	10^{-4}	289	52	1.40	0.19	0.99	0.14
	ML	6×10^{13}	10^{-4}	718	46	6.83	0.17	0.37	0.13
	BL	6×10^{13}	10^{-4}	272	64	7.45	0.22	1.20	0.16
	BL	1×10^{14}	10^{-4}	252	66	8.26	0.25	1.46	0.18
IRDS LP (“5am eq”)			10^{-4}	587	65	——	0.37	1.13	0.40
n-type	ML	1×10^{13}	10^{-2}	385	55	1.98	0.28	1.09	0.21
	ML	6×10^{13}	10^{-2}	305	58	1.03	0.79	3.91	0.60
	BL	1×10^{13}	10^{-2}	458	56	2.20	0.22	0.72	0.16
	BL	1×10^{14}	10^{-2}	1176	57	5.72	0.34	0.44	0.26
	TL	1×10^{13}	10^{-2}	462	68	2.16	0.25	0.82	0.19
	TL	1×10^{14}	10^{-2}	749	71	6.43	0.36	0.72	0.27
p-type	ML	1×10^{13}	10^{-2}	289	52	1.40	0.15	0.75	0.11
	ML	1×10^{14}	10^{-2}	1309	46	8.20	0.26	0.30	0.20
	BL	1×10^{13}	10^{-2}	503	63	2.50	0.16	0.48	0.12
	BL	1×10^{14}	10^{-2}	1257	66	8.26	0.29	0.35	0.22
	TL	1×10^{13}	10^{-2}	589	72	2.97	0.18	0.46	0.14
	TL	1×10^{14}	10^{-2}	738	76	6.75	0.32	0.65	0.24
IRDS HP (“5am eq”)			10^{-2}	790	70	——	0.37	0.84	0.40

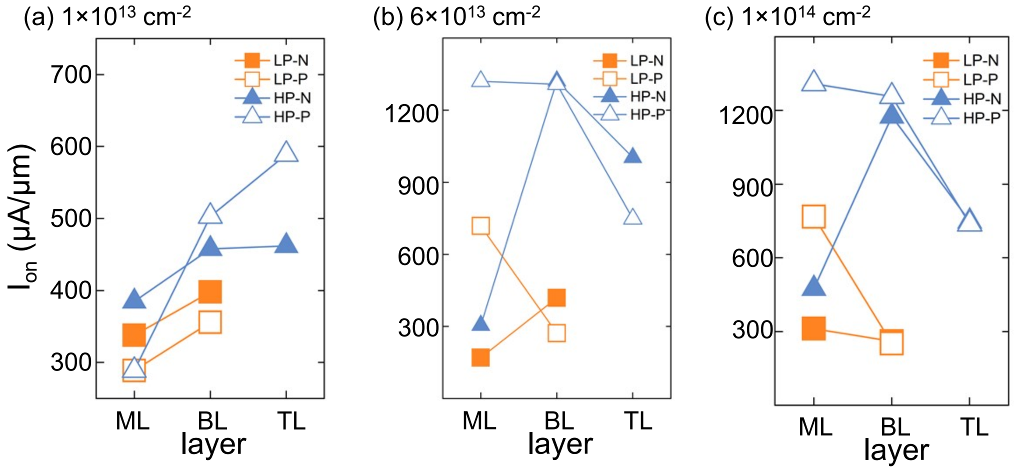

Figure S1. Layer-dependent I_{on} of the *n*- and *p*-type 10-nm-gate MoS_2 MOSFETs under doping concentrations of (a) 1×10^{13}, (b) 6×10^{13}, and (c) 1×10^{14} cm^{-2} for LP and HP applications.