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Supplementary information

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Reporting Hall effect measurements of charge carrier mobility in emerging materials

In the format provided by the authors and unedited

Table 1 below lists room-temperature Hall mobilities, μ_{Hall}, reported for the three groups of materials (metal-oxide or metal-halide perovskites, conjugated polymers, and crystalline small-molecule organic semiconductors) in the period between 2003 and 2023. The listed μ_{Hall} are those reported as extracted directly from measurements, without any normalization or theoretical adjustments. The Table also lists the Hall reliability score, r_{Hall}, calculated for each paper according to the *checklist* of Hall effect measurements introduced in this article. This parameter (an integer between 0 and 16) is designed as a metric for evaluating the completeness, reliability, and potential reproducibility of Hall mobility measurements reported in papers. The Table is not intended to provide an exhaustive list of literature on each class of materials. A detailed methodology of r_{Hall} calculation is given after the Table.

Table 1. Papers (with hyperlinks) reporting a Hall mobility, μ_{Hall}, in perovskites, conjugated polymers, and crystalline small-molecule organic semiconductors, published in 2003 - 2023,[1-110] with the Hall reliability score r_{Hall} calculated according to the procedure described below. For each paper, the highest reported room-temperature μ_{Hall} is listed. For papers reporting Hall effect measurements at other temperatures, r_{Hall} is still calculated, but μ_{Hall} is omitted from the Table.

Paper reporting Hall-effect mobility	Material	μ_{Hall} $cm^2V^{-1}s^{-1}$	r_{Hall}	Ref.
Perovskites				
E. Bellingeri, et al. *J. Appl. Phys.* (2003)	$SrTiO_3$	3.9	9	[1]
T. Ishikawa, et al. *J. Phys. Soc. Jpn.* (2004)	$SrTi^{16}O_3$	-	5	[2]
F. Pan, et al. *Appl. Phys. Lett.* (2004)	$La:SrTiO_3$	3	8	[3]
A. Kalabukhov, et al. *Phys. Rev. B* (2007)	$SrTiO_3$ on $LaAlO_3$	10	1	[4]
H. Nakamura, et al. *J. Phys. Soc. Jpn.* (2009)	$SrTiO_3$	-	13	[5]
H. Kim, et al. *Phys. Rev. B* (2012)	$(Ba,La)SnO_3$	300	5	[6]
I. Chung, et al. *J. Am. Chem. Soc.* (2012)	$CsSnI_3$	585	2	[7]
H. Kozuka, et al. *J. Mater. Chem.* (2012)	$La_{1-x}Sr_xCoO_3$	5.8	3	[8]
Y. Takahashi, et al. *J. Solid State Chem.* (2013)	$CH_3NH_3SnI_3$	150	1	[9]
C. Stoumpos, et al. *Inorg. Chem.* (2013)	$CH_3NH_3SnI_3$	2320	3	[10]
A. Ali, et al. *J. Korean Phys. Soc.* (2013)	$La_{0.01}Ba_{0.99}TiO_3$	0.2	6	[11]
W. Lee, et al. *Phys. Status Solidi A.* (2015)	$Ba_{0.96}La_{0.04}SnO_3$	-	13	[12]
D. Luo, et al. *RSC Adv.* (2015)	$CH_3NH_3PbI_{3-x}Cl_x$	13.5	0	[13]
M. Vigneshwaran, et al. *Chem. Mater.* (2016)	$(CH_3NH_3)_3Bi_2I_9$	2.28	0	[14]
B. Li, et al. *J. Alloy. Compd.* (2016)	$Ba(Nb_xSn_{1-x})O_3$	19.65	0	[15]
Y. Chen, et al. *Nat. Commun.* (2016)	$CH_3NH_3PbBr_3$	60	16	[16]
J. Shiogai, et al. *AIP Adv.* (2016)	$La:BaSnO_3$	78	1	[17]
B. Saparov, et al. *Chem. Mater.* (2016)	Cs_2SnI_6	2.9	3	[18]
F. Guo, et al. *Mater. Res. Lett.* (2017)	Cs_2SnI_6	509	0	[19]
H. Zhang, et al. *Cryst. Growth Des.* (2017)	$CsPbBr_3$	143	1	[20]
R. Kikuchi, et al. *Chem. Mater.* (2017)	$SrNbO_2N$	0.1	0	[21]

(For *Hall checklist form*, see the last two pages)

Paper reporting Hall-effect mobility	Material	μ_{Hall} $cm^2V^{-1}s^{-1}$	r_{Hall}	Ref.
Z. Su, et al. *J. Mater. Sci-mater. El.* (2017)	$CH_3NH_3PbBr_3$	2630	0	[22]
C. Chung, et al. *J. Mater. Chem. A* (2017)	$GO:CH_3NH_3PbI_3$	35.3	0	[23]
B. Li, et al. *J. Alloy. Compd.* (2017)	$Ba_{1-x}Sm_xSnO_3$	4.266	0	[24]
D. Ju, et al. *J. Mater. Chem. A* (2018)	$MA_3Sb_2I_9$	43	1	[25]
H. Yi, et al. *Phys. Rev. Appl.* (2018)	$CsPbBr_3$	9.5	14	[26]
E. McCalla, et al. *Phys. Rev. Mater.* (2018)	$Ba_{1-x}Nd_xSnO_{3-\delta}$	174	0	[27]
J. Han, et al. *Small* (2018)	$CH_3NH_3PbI_3$-PbS	1173	0	[28]
J. Zhang, et al. *J. Mater. Sci.* (2018)	B-γ-$CsSnI_3$	18.48	0	[29]
J. Shin, et al. *Phys. Rev. Mater.* (2018)	$BaSn_{1-x}Hf_xO_3$	95.3	0	[30]
Y. Yang, et al. *J. Mater. Sci-mater. El.* (2018)	$NaI:CH_3NH_3PbI_3$	63.7	0	[31]
D. Gao, et al. *Phys. Status Solidi-r.* (2019)	$BaTi_{0.75}Nb_{0.25}O_3$	0.4	0	[32]
O. Gunawan, et al. *Nature* (2019)	$(FA,MA)Pb(I,Br)_3$	9.8	16	[33]
T. Lien, et al. *Mater. Res. Express* (2019)	Cs_2SnI_6	468.1	0	[34]
Q. Gao, et al. *ACS Appl. Mater. Inter.* (2019)	$La_{0.05}Sr_{0.95}PbO_3$	39.9	0	[35]
H. Wang, et al. *Phys. Rev. Mater.* (2019)	$BaSnO_3$	37	3	[36]
D. Shan, et al. *Nanoscale Res. Lett.* (2019)	$CH_3NH_3PbI_3$	5	0	[37]
A. Musiienko, et al. *Energ. Environ. Sci.* (2019)	$CH_3NH_3PbBr_3$	87.1	15	[38]
K. Miura, et al. *Phys. Status Solidi A.* (2019)	$(Ba,La)SnO_3$	33	2	[39]
Z. Khan, et al. *J. Mater. Sci-mater. El.* (2019)	$CH_3NH_3PbI_3$	195	0	[40]
S. Ullah, et al. *Semicond. Sci. Tech.* (2020)	Cs_2SnI_6	425	0	[41]
A. Dayan, et al. *Mater. Adv.* (2020)	$CsSnI_3$	9	0	[42]
K. Li, et al. *Opt. Mater.* (2020)	$(Sm_xSr_{1-x})SnO_3$	14.8	0	[43]
A. Kirmani, et al. *Plos One* (2020)	$CH_3NH_3PbBr_3$	319.98	2	[44]
F. Li, et al. *J. Mater. Chem. A* (2020)	$Rb_3Sb_2I_9$	0.26	5	[45]
L. Jin, et al. *J. Mater. Sci-mater. El.* (2020)	$CH_3NH_3PbI_3$	90	2	[46]
X. Wei, et al. *Nano Energy* (2020)	$BaZrS_3$	13.7	12	[47]
Y. Wang, et al. *Nat. Nanotechnol.* (2020)	$CsPbBr_3$	118	13	[48]
H. Shaili, et al. *RSC Adv.* (2021)	$Pr:SrSnO_3$	7.6	0	[49]
A. Musiienko, et al. *Adv. Funct. Mater.* (2021)	$CH_3NH_3PbI_3$	12	14	[50]
A. Karim, et al. *Sci. Rep.* (2021)	$CH_3NH_3PbI_{3-x}Cl_x$	49	1	[51]
J. Wang, et al. *J. Phys. D. Appl. Phys.* (2021)	Cs_2SnI_6	391	0	[52]
Y. Tomioka, et al. *J. Phys. Soc. Jpn.* (2021)	$LaNiO_3$	-	3	[53]
Q. Li, et al. *Chinese Phys. B* (2021)	$Sr:Ba_{0.7}La_{0.3}TiO_3$	0.36	0	[54]
H. Shaili, et al. *J. Alloy. Compd.* (2021)	$CaSnS_3$	131	0	[55]
V. Bruevich, et al. *Adv. Mater.* (2022)	$CsPbBr_3$	30	16	[56]
T. Liu, et al. *Appl. Phys. Lett.* (2022)	$MAPb_{1-x}Cu_xI_3$	90.1	2	[57]
J. Zhang, et al. *Nanomater.* (2022)	$Li:Cs_2SnI_6$	356.6	0	[58]
Y. Reo, et al. *Adv. Funct. Mater.* (2022)	$(PEA)_2SnI_4$	100	1	[59]
A. Chauhan, et al. *Microelectron. Eng.* (2022)	$CsPbBr_2Cl$	9	0	[60]
R. Ismail, et al. *Opt. Mater.* (2022)	$CH_3NH_3PbI_3$	0.26	0	[61]
A. Liu, et al. *Nat. Electron.* (2022)	$CsSnI_3$	486	1	[62]
K. Belthle, et al. *Adv. Funct. Mater.* (2022)	$La:BaSnO_3$	70	1	[63]
V. Murgulov, et al. *J. Mater. Sci.* (2022)	$Cs_2AgBiBr_6$	2.36	3	[64]
Polymers				
S. Chen, et al. *J. Phys. Chem. B* (2005)	PPEEB	0.5	2	[65]
G. Lee, et al. *Curr. Appl. Phys.* (2012)	P3IT	-	0	[66]

(For *Hall checklist form*, see the last two pages)

Paper reporting Hall-effect mobility	Material	μ_{Hall} $cm^2V^{-1}s^{-1}$	r_{Hall}	Ref.
S. Wang, et al. *Nat. Commun.* (2012)	P3HT	-	16	[67]
S. Lee, et al. *Adv. Funct. Mater.* (2014)	HBr:PEDOT	8	3	[68]
B. Gupta, et al. *J. Mater. Chem. C* (2015)	PIM-1	4.4E−6	5	[69]
D. Scholes, et al. *J. Phys. Chem. Lett.* (2015)	F_4TCNQ:P3HT	0.0241	5	[70]
S. Senanayak, et al. *Phys. Rev. B* (2015)	2DPP-TEG	1.2	14	[71]
S. Ozaki, et al. *Synthetic Met.* (2016)	PEDOT:PSS	0.49	16	[72]
Y. Yamashita, et al. *Chem. Mater.* (2016)	CDT-BTZ-C20	2.6	13	[73]
D. Scholes, et al. *Adv. Funct. Mater.* (2017)	F_4TCNQ:P3HT	0.12	5	[74]
S. Kim. *B. Kor. Chem. Soc.* (2017)	PEDOT:PSS/GQD	0.23	0	[75]
R. Fujimoto, et al. *Org. Electron.* (2017)	PBTTT-C16/F_4-TCNQ	1.5	16	[76]
S. Rudd, et al. *J. Polym. Sci. Pol. Phys.* (2018)	Tos/ClO_4:PEDOT	3	0	[77]
T. Aubry, et al. *Adv. Mater.* (2019)	DDB-F_{72}:P3HT	0.1	5	[78]
D. Scholes, et al. *Chem. Mater.* (2019)	F_4TCNQ:P37S	0.17	3	[79]
Y. Zheng, et al. *J. Phys. D. Appl. Phys.* (2019)	PEDOT:PSS	0.299	0	[80]
P. Stadler, et al. *Org. Electron.* (2019)	PEDOT:TfO	0.3	8	[81]
S. Yoon, et al. *ACS Appl. Mater. Inter.* (2020)	F_4TCNQ:PIDF-BT	0.7	6	[82]
H. Li, et al. *Adv. Funct. Mater.* (2020)	$FeCl_3$:PDPP-$g_3$2$T_{0.3}$	2	7	[83]
J. Park, et al. *Adv. Funct. Mater.* (2020)	F_4TCNQ:PIDF-BT	0.85	7	[84]
G. Drewelow, et al. *Appl. Surf. Sci.* (2020)	PEDOT	5	0	[85]
A. Almohammedi, et al. *Mat. Sci. Semicon. Proc.* (2020)	PbI_2:P3HT	0.223	1	[86]
I. Paulraj, et al. *ACS Appl. Mater. Inter.* (2021)	EG/$NaBH_4$:PEDOT:PSS	33.6	0	[87]
B. Kim, et al. *Adv. Funct. Mater.* (2021)	EPG:graphene	701	1	[88]
Z. Liang, et al. *Nat. Mater.* (2021)	$FeCl_3$:P3HT	0.3	14	[89]
A. Anbalagan, et al. *RSC Adv.* (2021)	PEDOT:PSS	0.3	0	[90]
M. Zhang, et al. *J. Water Process. Eng.* (2022)	$ZnIn_2S_4$:PEDOT	173.15	0	[91]
X. Wang, et al. *Adv. Mater.* (2023)	FBDPPV-OEG	0.14	6	[92]
Organic Crystals				
V. Podzorov, et al. *Phys. Rev. Lett.* (2005)	rubrene	10	14	[93]
J. Takeya, et al. Jpn. *J. Appl. Phys.* (2005)	rubrene	1.5	13	[94]
J. Takeya, et al. *Phys. Rev. Lett.* (2007)	rubrene	7.5	13	[95]
N. Minder, et al. *Adv. Mater.* (2012)	PDIF-CN_2	6	13	[96]
T. Uemura, et al. *Curr. Appl. Phys.* (2012)	C_{10}-DNTT	11	8	[97]
T. Uemura, et al. *Phys. Rev. B* (2012)	pentacene	0.6	13	[98]
B. Lee, et al. *Nat. Mater.* (2013)	rubrene	6.5	14	[99]
W. Xie, et al. *Phys. Rev. Lett.* (2014)	rubrene	4	13	[100]
J. Takeya, et al. *Thin Solid Films* (2014)	DNTT	2.1	11	[101]
H. Yi, et al. *Sci. Rep.* (2016)	rubrene	6	10	[102]
C. Ohashi, et al. *Adv. Mater.* (2017)	$FeCl_3$:rubrene	4.6	12	[103]
X. Ren, et al. *Adv. Electron. Mater.* (2017)	rubrene	14.6	10	[104]
H. Choi, et al. *Adv. Funct. Mater.* (2018)	rubrene	4.25	16	[105]
M. Kikuchi, et al. *Appl. Phys. Lett.* (2019)	MoO_3:rubrene	0.8	10	[106]
H. Choi, et al. *Adv. Sci.* (2020)	rubrene	7	16	[107]
S. Kumagai, et al. *Adv. Mater.* (2020)	PhC_2-BQQDI	4	13	[108]

(For *Hall checklist form*, see the last two pages)

Paper reporting Hall-effect mobility	Material	μ_{Hall} $cm^2V^{-1}s^{-1}$	r_{Hall}	Ref.
H. Choi, et al. *Adv. Funct. Mater.* (2020)	rubrene	5.1	16	[109]
V. Bruevich, et al. *Adv. Funct. Mater.* (2021)	rubrene	16	13	[110]

The Hall reliability score, r_{Hall}, has been calculated using the checklist given below (with the number of points assigned for each item indicated).†

1. Varying the magnetic field and longitudinal excitation current.

1.1. Varying or reversing the magnetic field (2 points). Raw Hall data (i.e., the Hall voltage, V_{Hall}, or the Hall resistance, R_{Hall}) or the extracted Hall parameters (i.e., the Hall mobility, μ_{Hall}, or the Hall carrier concentration, n_{Hall}) recorded when the magnetic field, B, is changed should be shown. At least two measurements at different non-zero magnetic fields must be taken and reported, with μ_{Hall} calculated using the slope $\Delta V_{Hall}/\Delta B$, rather than an absolute value of as-measured V_{Hall} at a single value of B. In this measurement, the field's magnitude $|B|$ should be varied by at least a factor of two. Alternatively, the field can be zeroed or flipped (its direction changed to the opposite). In the *a.c.*-Hall methodology using an a.c.-B field and a lock-in detection of V_{Hall}, the magnetic field's variation (reversal) is automatically implemented. If only a description of μ_{Hall} calculation via the magnetic field reversal, sweeping, or zeroing is given, without showing the corresponding data, 1 point is assigned.

1.2. Varying or reversing the longitudinal excitation current (2 points). Raw Hall data (V_{Hall} or R_{Hall}) or the extracted μ_{Hall} or n_{Hall}, recorded when the longitudinal excitation current, I, or the corresponding voltage, V, are changed (both in terms of their magnitude and polarity) should be shown. At least two measurements at different excitation currents must be taken, with μ_{Hall} calculated from the slope $\Delta V_{Hall}/\Delta I$, rather than an absolute value of as-measured V_{Hall} at a single value of I. In such a measurement, the current's magnitude $|I|$ should be varied by at least a factor of two. Alternatively, the current can be zeroed, or its polarity switched. In the technique of *a.c.*-current excitation with a lock-in detection of the corresponding voltage, varying (reversing) the current is automatically implemented. If only a description of μ_{Hall} calculation via the excitation current reversal, sweeping, or zeroing is given, without showing the corresponding data, 1 point is assigned.

2. Linearity of the Hall voltage with the magnetic field and excitation current.

2.1. Linearity of $V_{Hall}(I)$ dependence (1 point). The dependence of the Hall observables (V_{Hall} or R_{Hall}) or the extracted Hall parameters (μ_{Hall} or n_{Hall}) on the longitudinal excitation current (i.e., $V_{Hall}(I)$, $\mu_{Hall}(I)$, etc.) should be measured and reported. The current should cover a sufficiently wide range, with its magnitude $|I|$ varied by at least a factor of two. The measurement should demonstrate a linearity of $V_{Hall}(I)$ dependence or show that the extracted μ_{Hall} and n_{Hall} are independent of I. This can also be addressed in the *a.c.*-Hall techniques, including that using an *a.c.*-current excitation with a lock-in detection of the corresponding voltage.

2.2. Linearity of $V_{Hall}(B)$ dependence (1 point). The dependence of the Hall observables (V_{Hall} or R_{Hall}) or the extracted Hall parameters (μ_{Hall} or n_{Hall}) on the external magnetic field (i.e., $V_{Hall}(B)$, $\mu_{Hall}(B)$, etc.) should be measured and reported. The field should cover a sufficiently wide range, with its magnitude $|B|$ varied by at least a factor of two. The measurement should demonstrate a linearity of $V_{Hall}(B)$ dependence or show that the extracted μ_{Hall} and n_{Hall} are independent of B. Alternatively, an *a.c.*-Hall method with an oscillating B-field and a lock-in detection of the corresponding Hall voltage can be employed to address this item.

3. Four-probe conductivity measurements (2 points). To determine the Hall mobility μ_{Hall} of the sample correctly, one must use of a contact-corrected conductivity σ. The four-probe techniques of σ measurements based on either the traditional Hall-bar geometry with a rectangular channel or a Van der Pauw (VDP) geometry could be used. However, the VDP technique is particularly prone to artifacts and inaccuracies. Thus, it is important to make sure that the following requirements/assumptions are met/valid while using it: (a) all four contacts in VDP geometry must be very small compared to the size of the sample, or the sample should be patterned in such a way that a finite size of the contacts would not affect the measurement (e.g., using a "clover-shaped" pattern); (b) the sample should be homogeneous, and (c) isotropic (in-plane); (d) any parasitic voltage drops or offsets associated with, for instance, contact resistance, instrumental offsets, a thermoelectric effect, ionic migration, etc., must be small in comparison with the voltage drop between each pair of the voltage probes due to the sample's resistance.

Properly using a four-probe technique for measurements of σ in Hall effect studies, with a detailed description and addressing the above concerns, is important (**2 points**). If not using a four-probe technique to extract σ, contact resistance must be shown to be much smaller than the channel resistance by other experimental techniques (e.g., transmission line method) (**1 point**). Essentially, it is necessary to experimentally show that the longitudinal voltage drop along the conduction channel of the sample/device is much greater than the voltage drop across the contacts in the entire excitation voltage or current ranges of the Hall measurements. If this is shown, a two-probe σ can be used in the calculation of μ_{Hall}.

4. Switching between contacts in Van der Pauw configuration (2 points). If a VDP technique is used, it must be shown that the artifacts listed in the previous section are eliminated. This can be done by testing all possible combinations of contact pairs, with the excitation current in both polarities for each combination: in total, 8 individual measurements of σ and 4 individual measurements of V_{Hall} (considering that a reversal of the *B*-field is performed for each choice of contacts, as described in **sec. 1.1**). The data should be analyzed by calculating the standard deviations and the properly calculated mean values for σ and μ_{Hall}. Importantly, it must be checked that the individual measurements of σ and μ_{Hall} are not self-contradictory. Namely, if the standard deviation is not smaller than the mean value, the measurements should be considered unreliable, which is most likely caused by a strong asymmetry in the physical characteristics of the contacts or inhomogeneities of the sample. In rare cases, significant variability of the measurement results between different contact pairs in VDP measurements can be associated with intrinsic or extrinsic anisotropy of samples, as described in the main text, in which case further control tests are necessary. The results of all individual-contact-pair VDP measurements, their analysis, and the final calculated averaged values should be presented. If only a description of the use of a proper contact geometry and method, including switching between contact pairs, is given, without showing the raw data, **1 point** is assigned.

(For *Hall checklist form*, see the last two pages)

5. Long-term evolution and hysteresis of the Hall signal (1 point). Showing data on the time evolution of the Hall signal (V_{Hall} or R_{Hall}) or the extracted Hall parameters (μ_{Hall} or n_{Hall}) is important. A procedure for subtracting a possible drifting or fluctuating background must be explained. Alternatively, hysteresis in the measured dependences of μ_{Hall} on the B-field, excitation current I, temperature T, or gate voltage V_G, should be characterized and shown to be insignificant. For example, demonstrating a good long-term stability of μ_{Hall} (with the background properly subtracted) or a negligible hysteresis in $\mu_{Hall}(B, I, T, V_G)$ dependences is sufficient. This section is relevant to both *d.c.*- and *a.c.*-Hall measurements.

6. Apparent frequency dependence in *a.c.*-Hall measurements (1 point). In *a.c.*-Hall measurements, the dependence of the Hall signal (V_{Hall} or R_{Hall}) or the extracted Hall quantities (μ_{Hall} or n_{Hall}) on the frequency, f, of the oscillating B-field or the longitudinal excitation current I should be additionally investigated. A zero-frequency offset of the experimental $\mu_{Hall}(f)$ dependence (i.e., the asymptotic value $\mu_{Hall}(f \to 0)$) should be taken as the true Hall mobility, corrected for the Faraday induction artifact and possible other frequency dependent contributions. For *a.c.*-Hall measurements, this section and the previous **sec. 5** collectively earn a maximum of 1 point.

7. Including raw Hall data in publications.

7.1. Raw Hall data corresponding to the reported μ_{Hall} should be shown (1 point). These include raw Hall data (V_{Hall} or R_{Hall}) plotted as a function of important common experimental parameters (i.e., B, I, or V_G) or as time traces recorded while these parameters are varied. Alternatively, time or frequency (for *a.c.*-Hall measurements) dependence of the extracted Hall quantities (μ_{Hall} or n_{Hall}) could be reported. These data must be sufficiently detailed to allow, in combination with the listed device parameters (**sec. 8**), an independent extraction of μ_{Hall}.

7.2. In VDP measurements, V_{Hall} for both combinations of contacts must be reported (1 point). When a VDP methodology is used, $V_{Hall}(B, I)$ dependences and $V_{Hall}(t)$ time traces, or a Table listing the results of individual measurements for both combinations of contacts and both current polarities (4 measurements in total), should be included in publications. At the very least, one representative set of such raw data must be shown, in addition to a Table listing all the individual results for each combination of contacts, their standard deviation, and the correctly calculated final value.

8. Description of studied devices.

8.1. Contact geometry and relevant dimensions must be explicitly listed (1 point). All the relevant in-plane sample dimensions, including the channel's width and length, distances between the voltage probes and their width, as well as the total thickness of the sample (especially important when bulk (3D) conductivity is reported/used), must be listed. Alternatively, a photograph with a scale bar for each key device can be included. This information, in combination with the presented raw Hall data (**sec. 7**), must be sufficient for an independent verification of the reported μ_{Hall}.

8.2. Device architecture and the origin of mobile charges must be discussed (1 point). A sufficiently detailed description of devices' architecture, including their cross-sectional structure, with all the layers' thicknesses and other relevant dimensions, must be included. The source of mobile charge carriers must be explained (e.g., a carrier injection via an electric-field effect as in FETs, a chemical doping or self-doping of films or crystals, a charge-transfer doping at interfaces, a photogeneration of carriers as in photo-Hall effect measurements). This information, together with the information on the in-plane device layout (**sec. 8.1**) and the raw Hall data (**sec. 7**), must be sufficient for an independent verification of the reported μ_{Hall}. For example, when FETs are used to induce conductivity, the corresponding device parameters, including the type of the gate insulator, its thickness, dielectric constant, and the gate-channel capacitance, must be listed.

8.3. Device photos and sketches should be included (1 point). Sufficiently high-resolution (micro)photographs of key devices must be shown. All elements of the device should be clearly visible. Alternatively, a detailed sketch of the sample, showing the contact layout and channel geometry, can be included.

(For *Hall checklist form*, see the last two pages)

† Points for each item of the checklist were assigned only if the results of the corresponding measurement/test/procedure were not self-contradictory or contradicting the other items of the checklist or the overall conclusion of a paper. For instance, if contact switching in VDP geometry (**sec. 4**) has been performed, but individual measurements using different contact pairs led to inconsistent results (e.g., drastically different μ_{Hall} values), and this issue has not been addressed by the authors, zero points would be assigned for this item.

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Manuscript (Corr. Author/Title/Number): Date:

Form: checklist for Hall mobility reporting

This form is recommended for use by authors or reviewers of experimental manuscripts reporting Hall mobility (μ_{Hall}) measurements in semiconducting materials. It is based on the *Hall checklist* described in detail in Bruevich, V. & Podzorov, V. Reporting Hall effect measurements of charge carrier mobility in emerging materials, *Nat. Electron.* (2024). Completing this form should help authors to improve the thoroughness and reliability of their Hall effect measurements. Likewise, reviewers can use this form to evaluate completeness, reliability, and potential reproducibility of μ_{Hall} measurements reported in manuscripts. Adhering to the checklist and completing this form are especially recommended when novel (underexplored) materials or materials and devices with relatively low charge carrier mobilities are investigated.

Are the following details of Hall measurements included in the manuscript?

1. Varying (reversing) the magnetic field and longitudinal excitation current.

Magnetic field (B) variation/reversal
μ_{Hall} extraction takes into account zero field offset

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this is not reported*

Current variation/reversal
μ_{Hall} extraction takes into account current offset

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this is not reported*

2. The linearity of the Hall voltage with the magnetic field and excitation current.

$V_{Hall}(B)$ or $R_{Hall}(B)$ dependences
For extraction of μ_{Hall}, these dependences should be linear with B

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this is not reported*
☐ Elsewhere *Include a reference to your prior paper for the same system/material(s)*

$V_{Hall}(I)$ or $R_{Hall}(I)$ dependence
For extraction of μ_{Hall}, these dependences should be linear with I

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this is not reported*
☐ Elsewhere *Include a reference to your prior paper for the same system/material(s)*

3. Addressing contact artifacts via proper use of four-probe conductivity measurements.

All reported Hall-effect and conductivity data were obtained using a four-probe technique

☐ Yes *State where this is described in the manuscript*
☐ No *Explain why this was not the case*

Contact resistance is shown to be negligible
If four-probe technique was not used in extracting μ_{Hall}, verify that contact resistance is negligible

☐ Yes *State where this is described in the manuscript*
☐ No *Explain why this was not done*
☐ Elsewhere *Include a reference to your prior paper for the same system/material(s)*

4. Switching between contacts in Van der Pauw (VDP) configuration (only for VDP measurements).

σ was measured using all VDP contact configurations and current polarities

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this was not done*

V_{Hall} was measured using all VDP contact configurations and current polarities

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this was not done*

5. Long-term evolution and hysteresis of the Hall signal.

Temporal evolution of the Hall effect
For instance, V_{Hall} (t) or μ_{Hall} (t) data

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this is not reported*

Hysteresis in Hall measurements

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this is not reported*

6. Apparent frequency dependences, $V_{\text{Hall}}(f)$ or $\mu_{\text{Hall}}(f)$ (only for *a.c.*-Hall measurements using a *B*-field oscillating at freq. *f*).

Dependence of V_{Hall} or μ_{Hall} on the frequency *f* of *B* field

☐ Yes *State where this can be found in the manuscript*
☐ No *Explain why this is not reported*
☐ Elsewhere *Include a reference to your prior paper for the same system/material(s)*

7. Including raw Hall data in the publication.

Raw data for the best/representative sample
For instance, V_{Hall} or R_{Hall}. A reader should be able to verify the reported Hall mobility calculation

☐ Yes *State where this information can be found in the manuscript*
☐ No *Explain why this is not reported*
☐ Elsewhere *Include a reference to your prior paper for the same system/material(s)*

8. Providing a sufficiently detailed description of the studied devices.

Contact geometry and relevant dimensions
All dimensions or detailed image included

☐ Yes *State where this information can be found in the manuscript*
☐ No *Explain why this is not reported*

Device architecture (cross-section) and origin of mobile charges

☐ Yes *State where this information can be found in the manuscript*
☐ No *Explain why this is not reported*

Device photos and/or sketches
Image of the reported key device with a scale bar

☐ Yes *State where this information can be found in the manuscript*
☐ No *Explain why this is not reported*

Additional Comments/Notes:

Further reading:

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