

ADVANCED FUNCTIONAL MATERIALS

Supporting Information

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Enhancement of Anomalous Hall Effect via Interfacial Scattering in Metal-Organic Semiconductor $\text{Fe}_x(\text{C}_{60})_{1-x}$ Granular Films Near the Metal-Insulator Transition

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1. $\rho_{xx} - T$ curves

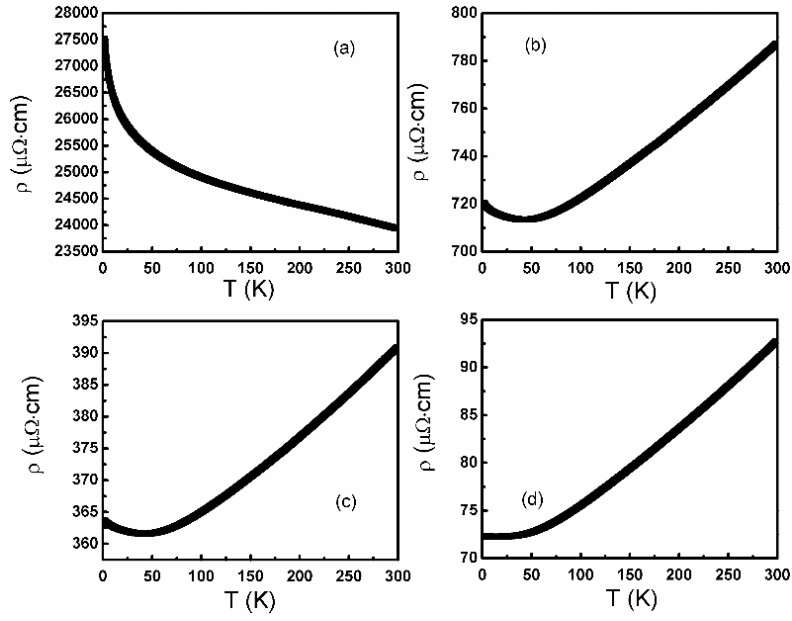


Figure S1. (a)-(d) $\rho_{xx} - T$ curves of S1, S3, S4, and S5, respectively.

2. $\sigma - T$ curves and the fitting curves

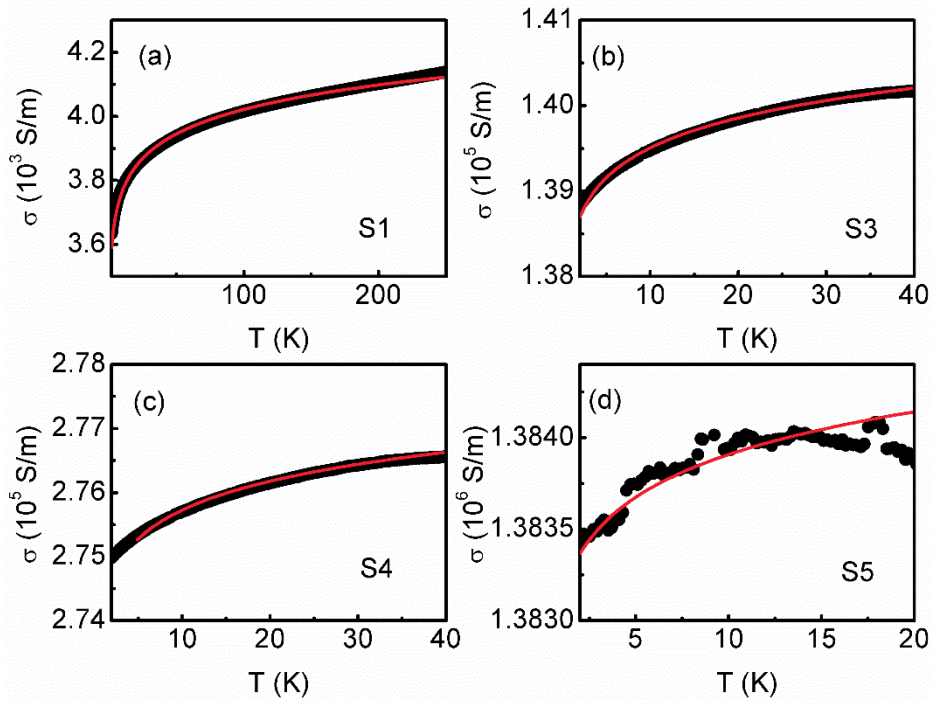


Figure S2. (a)-(d) $\sigma - T$ curves of S1, S3, S4, and S5 at low temperature, respectively. Red lines are the least-squares fittings according to Eq. (1).

3. Parameters obtained by fitting $\sigma - T$ curves

Table S1. Values of relevant parameters of S1, S3, S4 and S5. σ_0 , E_c/k_B and g_T are extracted by fitting $\sigma - T$ curves using Eq. (1). Grain diameter d_0 is calculated according to $E_c = e^2/4\pi\epsilon_0\epsilon_r d_0$. ϵ_r of C_{60} is 4.4 according to references [1] and [2].

Sample	x	σ_0 (S/m)	E_c/k_B (K)	E_c (meV)	g_T	d_0 (nm)
S1	0.58	4357	1001	86.3	2.09	3.8
S3	0.75	143100	824.5	71.1	15.05	4.6
S4	0.79	280500	667.5	57.8	22.85	5.7
S5	0.91	(1385000)	(64.8)	(5.6)	(218.12)	(58.5)

4. Saturated anomalous Hall resistivity and anomalous Hall coefficient

Table S2. Anomalous Hall resistivity ρ_{AHS} and anomalous Hall coefficient R_s of S1 at different temperatures.

T (K)	ρ_{AHS} ($\mu\Omega\cdot\text{cm}$)	R_s ($10^{-8} \Omega\cdot\text{cm}/\text{G}$)
300	74	9.9
200	70	7.2
100	66	6.6
50	63	4.8
20	63	4.0

5. Contributions of skew-scattering (α), side-jump (β) and intrinsic mechanism (b)

Table S3. Parameters α , β and b of different samples at the temperature of 2 K.

Sample	α	β ($\Omega^{-1}\cdot\text{cm}^{-1}$)	b ($\Omega^{-1}\cdot\text{cm}^{-1}$)
S3	1.078×10^{-2}	-23.7	20.3
S4	1.078×10^{-2}	-48.6	45.2
S5	1.078×10^{-2}	-244.7	241.3

6. Samples photos and conductive circuit

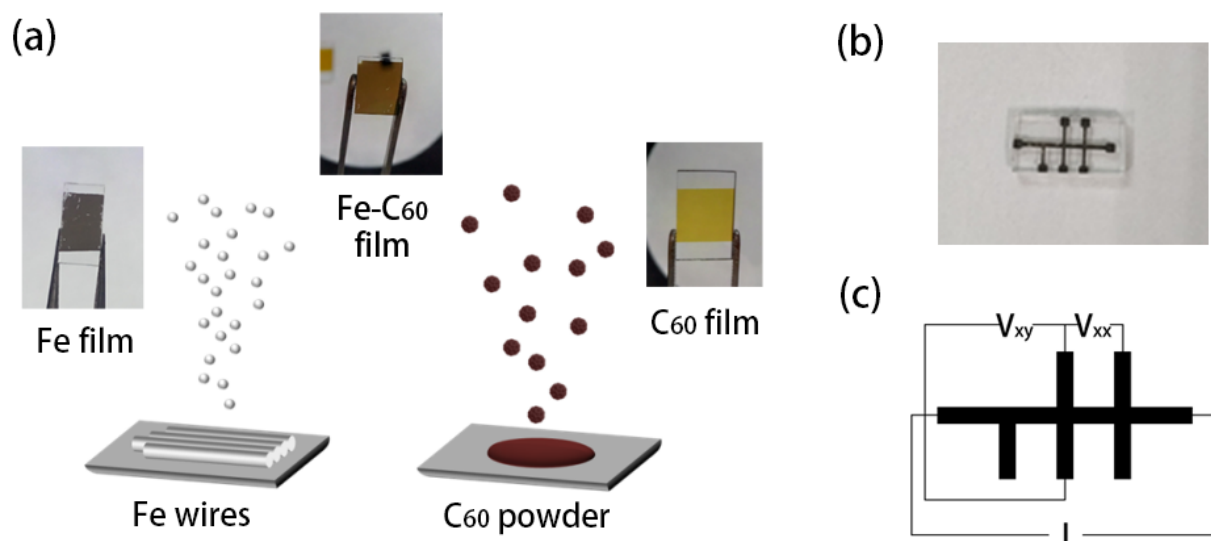


Figure S3. (a) The illustration diagram of evaporation process and sample photos. (b) The Hall bar photo. (c) The conductive circuit of resistance and Hall resistance measurements. V_{xx} and V_{xy} denote bias applied in resistance measurements and Hall resistance measurements, respectively.

7. SEM images

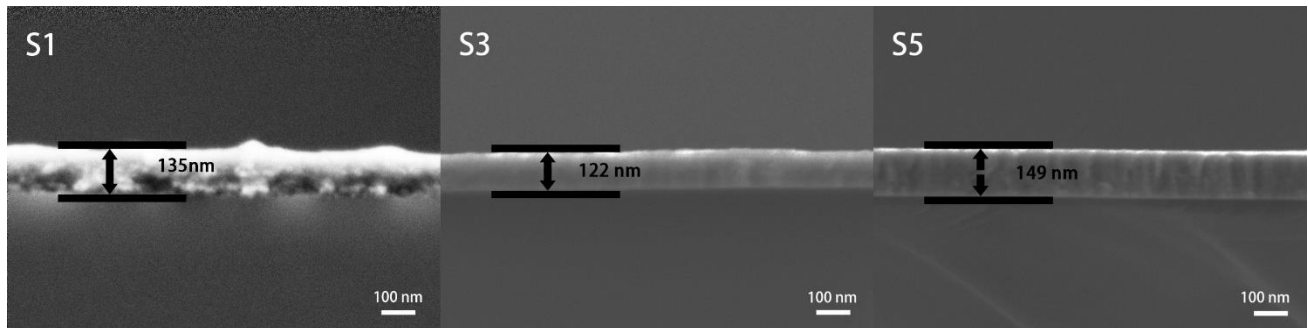


Figure S4. Cross-sectional SEM images of S1, S3 and S5.

References

- [1] A. F. Hebard, R. C. Haddon, R. M. Fleming, A. R. Kortan, *Appl. Phys. Lett.* **1991**, *59*, 2109–2111.
- [2] G. B. Alers, B. Golding, A. R. Kortan, R. C. Haddon, F. A. Theil, *Science* **1992**, *257*, 511–514.