Supplementary Information

Giant Spin Seebeck Effect through an Interface Organic Semiconductor

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S1. Anomalous Nernst effect measurement on the YIG/C_{60} structure

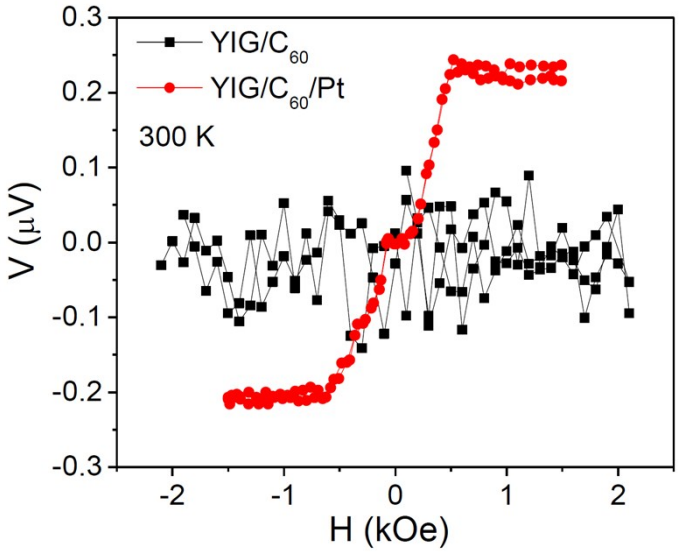

Fig. S1. ISHE voltage vs. magnetic field data taken at 300 K for the YIG/C_{60} and YIG/C_{60}/Pt structures.

We tested Anomalous Nernst effect (ANE) in the YIG/C_{60} structure, as shown in Fig. S1. It can be seen that the ANE signal is very weak and noisy. Also the low field anomaly of the V_{LSSE} vs. H curves observed in Figure 4a and b (also included in Fig. S1 for comparison) is due to the surface anisotropy of YIG. Since there is no anomalous Nernst effect present in YIG/C_{60}, the V_{LSSE} signals we have observed in YIG/C_{60}/Pt are dominated by the LSSE.

S2. ISHE voltage vs. magnetic field measurements on the C_{60}/Pt structure

To test if there is any considerable contribution to the LSSE (the V_{ISHE} signal obtained from Pt layer) from the Pt/C_{60} surface, we have fabricated two reference samples of SiO_2/Au (100 nm)/C_{60} (5 nm) / Pt (5 nm) and SiO_2/Ag (100 nm)/C_{60} (5 nm) / Pt (5 nm) and performed ISHE voltage vs. magnetic field measurements on these ssamples.

The Si/SiO_2 (300 nm) substrates were cleaned by a standard chemical cleaning procedure using soap, distilled water, acetone, and isopropanol in an ultrasonic bath. 2 nm of Cr was deposited first to enhance the adhesion between the silicon substrate and the Au/Ag layers. Both of the Cr (2nm) and Au/Ag (100nm) layers were deposited using an electron beam evaporator at a rate of 0.5 Å/s in a base pressure of $\approx 2 \times 10^{-7}$ torr. Without breaking the vacuum, a layer of 5nm C_{60} was deposited using thermal evaporation method. The material was evaporated at a rate of 0.2 Å/s at a temperature of 520 degrees Celsius, and 2×10^{-7} torr of pressure. 5 nm of platinum was then sputtered on top as mentioned in the manuscript.

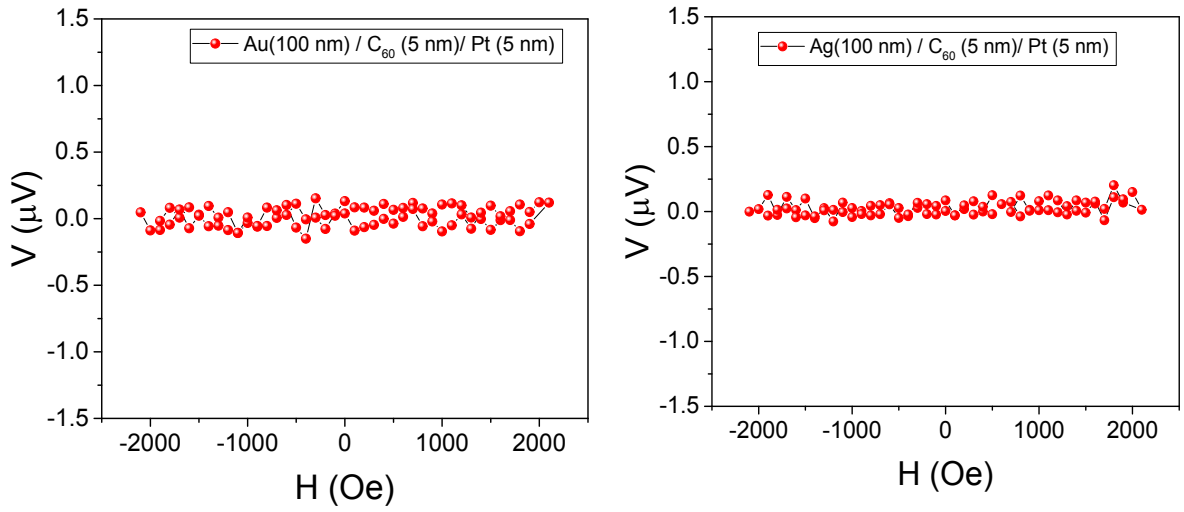

Fig. S2. V_{ISHE} vs. H data obtained from Pt layer at 300 K for Si/SiO_2/Au(100nm)/ C_{60} (5nm)/Pt(5nm) and Si/SiO_2/Ag(100nm)/ C_{60} (5nm)/Pt(5nm).

All measurements were performed at the same conditions as the YIG/C_{60}/Pt measurements by creating a ~ 2K temperature gradient across the samples. As can be seen in **Fig. S2**, both reference samples do not pick up any significant signal beyond the noise level. This confirms that the C_{60}/Pt interface does not contribute to the LSSE signal measured from Pt in **Figure 4**.