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Supplementary for "Wavelength-selective spin-current generator using infrared plasmonic metamaterials"

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Supplementary text

S1. Multiphysics simulation setting in Figure 2

The exterior side boundary conditions in the electromagnetic and heat transfer equations were set to be all periodic. Periodic boundary condition effectively represents a sample that was infinitely large in the horizontal directions. The input power was fixed at 10 mW for each wavelength.

In the electromagnetic simulation setting, scattering boundary conditions were set at the top and bottom. The top boundary also served as an excitation source which irradiated monochromatic continuous wave from 2.5 to 12.0 μm.

In the heat transfer simulation setting, both radiative and convection heat transfers were modeled at the top and bottom boundaries and thermal resistances were modeled at all the internal boundaries. The model was truncated at the exterior boundaries formed by the Al/air and Al_2O_3/air interfaces, so that the temperature in air region was not modeled. The environment temperature was 293.15 K.

Table S1. Parameters of the four samples.

	A0	A1	A2	A3
Al disk diameter [μm]	NA	0.99	1.44	2.16
periodicity [μm]	NA	1.83	1.81	3.14
Al thickness [nm]	NA	100	100	100
Al_2O_3 thickness [nm]	NA	200	200	250
Pt thickness [nm]	10	10	10	10

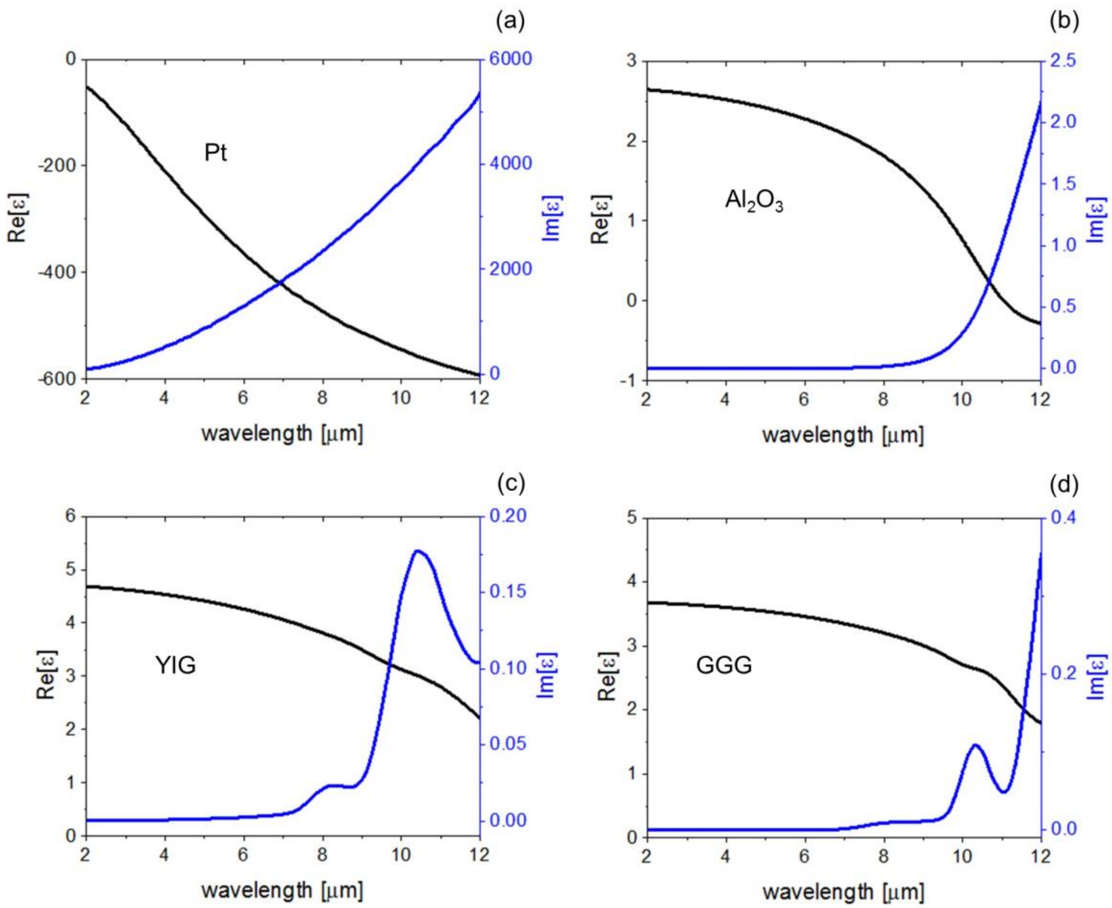

FIG. S1. Complex permittvities of (a) Pt, (b) Al_2O_3, (c) YIG, and (d) GGG retrieved from spectroscopic ellipsometry measurements in the mid-IR regime.

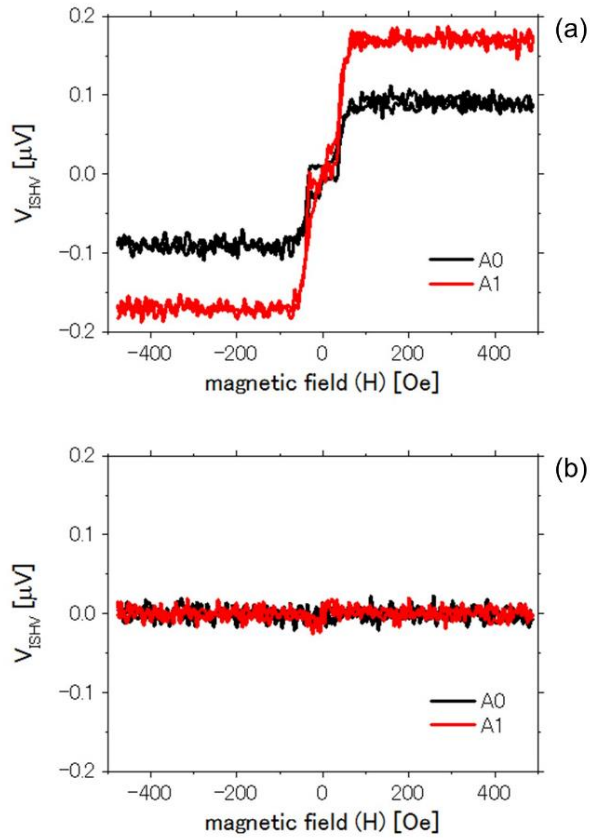

FIG. S2. (a), (b) Magnetic field dependence of the ISHE voltage (V_{ISHE}) at a wavelength of 4.0 μm and for a laser power of 12.3 mW. In sub-panels (a) and (b), the magnetic field was applied parallel to the *x* and *y* directions, respectively. A measurable voltage is recorded only when the magnetic field was applied parallel to the *x* direction, owing to the symmetry of the ISHE as shown in sub-panel (a). Identical measurements were performed at different wavelengths and the wavelength dependent V_{ISHE} is plotted in Fig. 5(b) in the main text.