Supplemental Material

Comparative experimental and theoretical study on anomalous Nernst effect of Heusler alloy Co2FeSi thin film: Estimation of on-site Coulomb interaction at Co

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Weinan Zhoua, Keisuke Masudaa, Kazuki Sumidab, Yuichi Fujitaa\*, Akio Kimurac,d,e, and Yuya Sakurabaa

aResearch Center for Magnetic and Spintronic Materials (CMSM), National Institute for Materials Science (NIMS), Tsukuba, Ibaraki, Japan;

bResearch Institute for Synchrotron Radiation Science, Hiroshima University, Higashi-Hiroshima, Hiroshima, Japan;

cGraduate School of Advanced Science and Engineering, Hiroshima University, HigashiHiroshima, Hiroshima, Japan;

dInternational Institute for Sustainability with Knotted Chiral Meta Matter (WPI-SKCM2), Higashi-Hiroshima, Hiroshima, Japan;

eSynchrotron Radiation Research Center, National Institutes for Quantum Science and Technology (QST), Sayo, Hyogo, Japan;

Contact:

Weinan Zhou ZHOU.Weinan@nims.go.jp; Yuya Sakuraba SAKURABA.Yuya@nims.go.jp

Research Center for Magnetic and Spintronic Materials (CMSM), National Institute for Materials Science (NIMS), Tsukuba, Ibaraki 305-0047, Japan

\*Present address: Global Research and Development Center for Business by Quantum-AI technology (G-QuAT), National Institute of Advanced Industrial Science and Technology (AIST),

Tsukuba, Ibaraki 305-8568, Japan

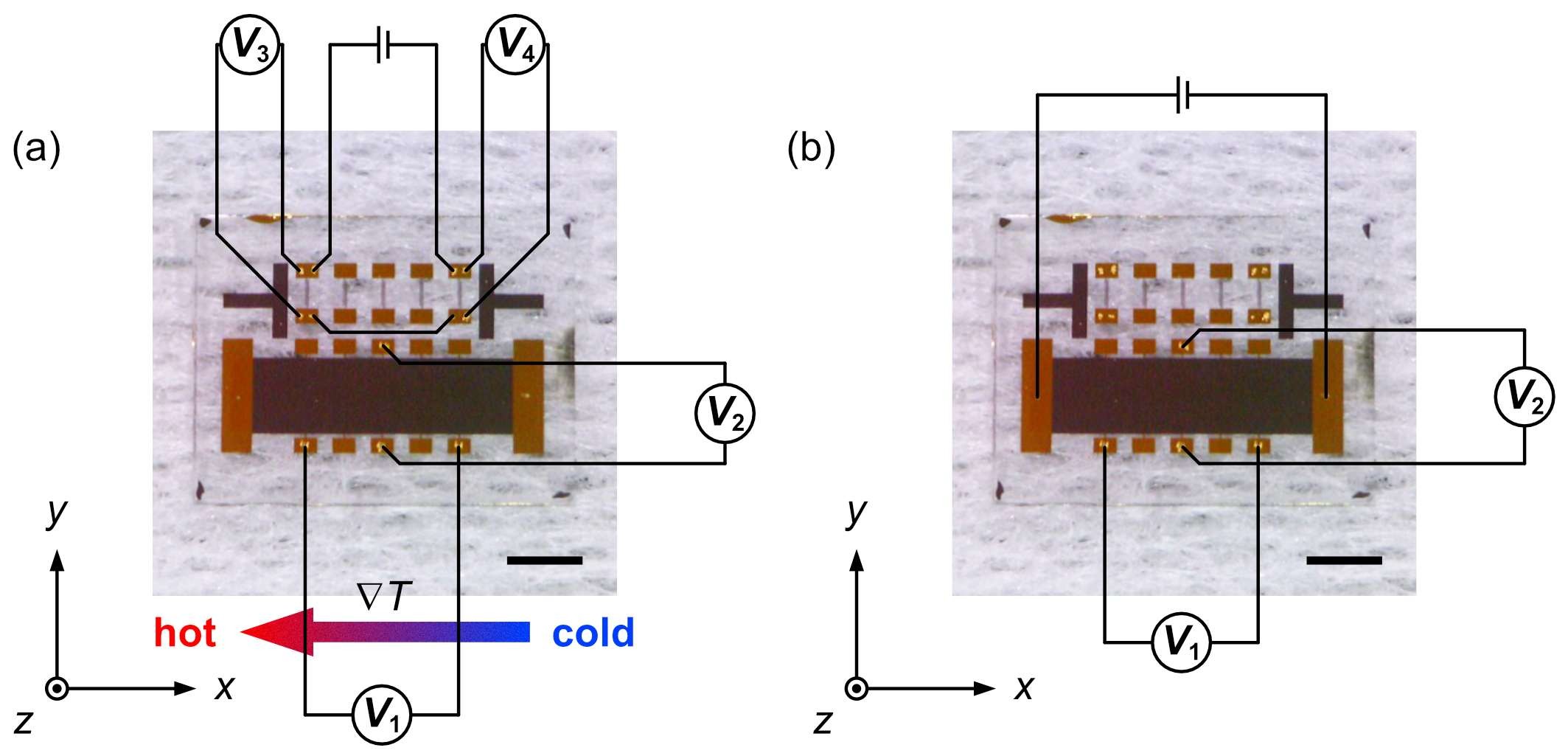


Figure S1. (a) Photograph of the patterned sample, together with the schematic representation of the experimental configuration for the ANE and (b) AHE measurements. The corresponding Cartesian coordinate system is also shown. In (a), V1, V2, V3, and V4 represent four nanovoltmeters measuring the longitudinal thermoelectric signal due to SE, the transverse thermoelectric signal due to ANE, the resistance of on-chip thermometers at the hot side and cold side of the sample, respectively. In (b), V1 and V2 represent 2 nanovoltmeters for measuring the longitudinal and transverse resistance, respectively. The scale bars in (a) and (b) indicate the length of 2 mm.

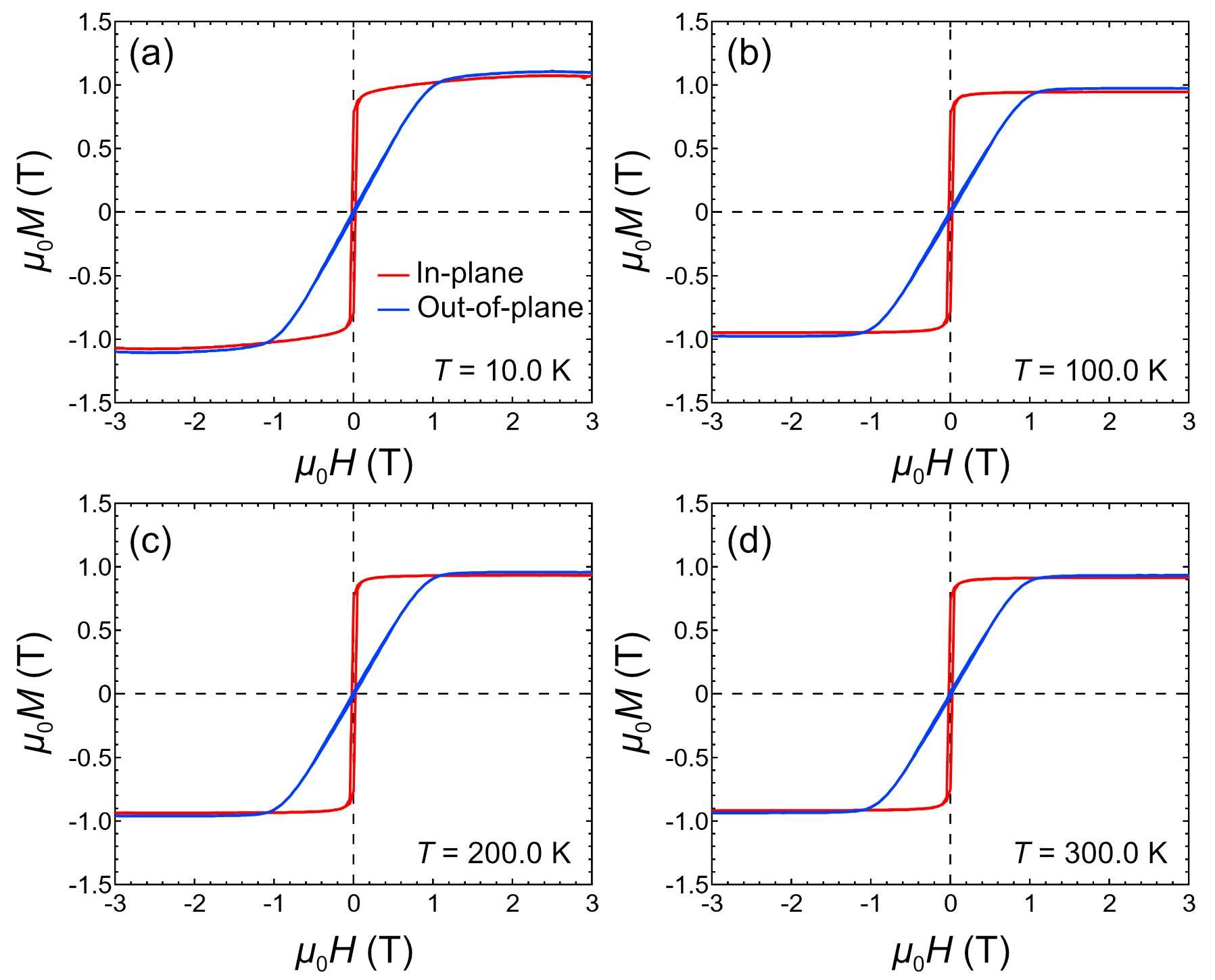


Figure R2. (a) In-plane and out-of-plane M-H curves of the Co2FeSi thin film measured at T = 10.0, (b) 100.0, (c) 200.0, and (d) 300.0 K. The shape of the out-of-plane M-H curves was consistent with the ANE and AHE results shown in Figure 2(a–d). The saturation magnetization (Ms) of Co2FeSi slightly increased with decreasing T. At 10 K, μ0Ms = 1.1 T, which corresponded to a magnetic moment of ~4.2 μB/f.u.

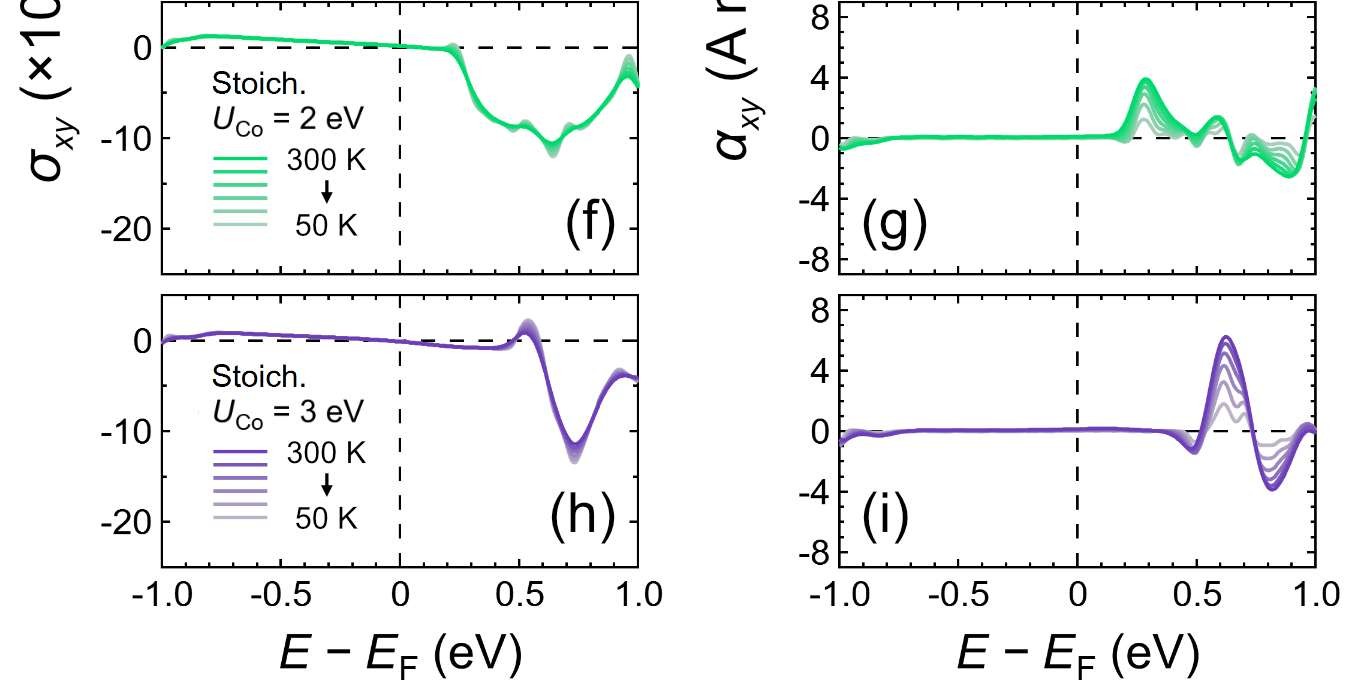
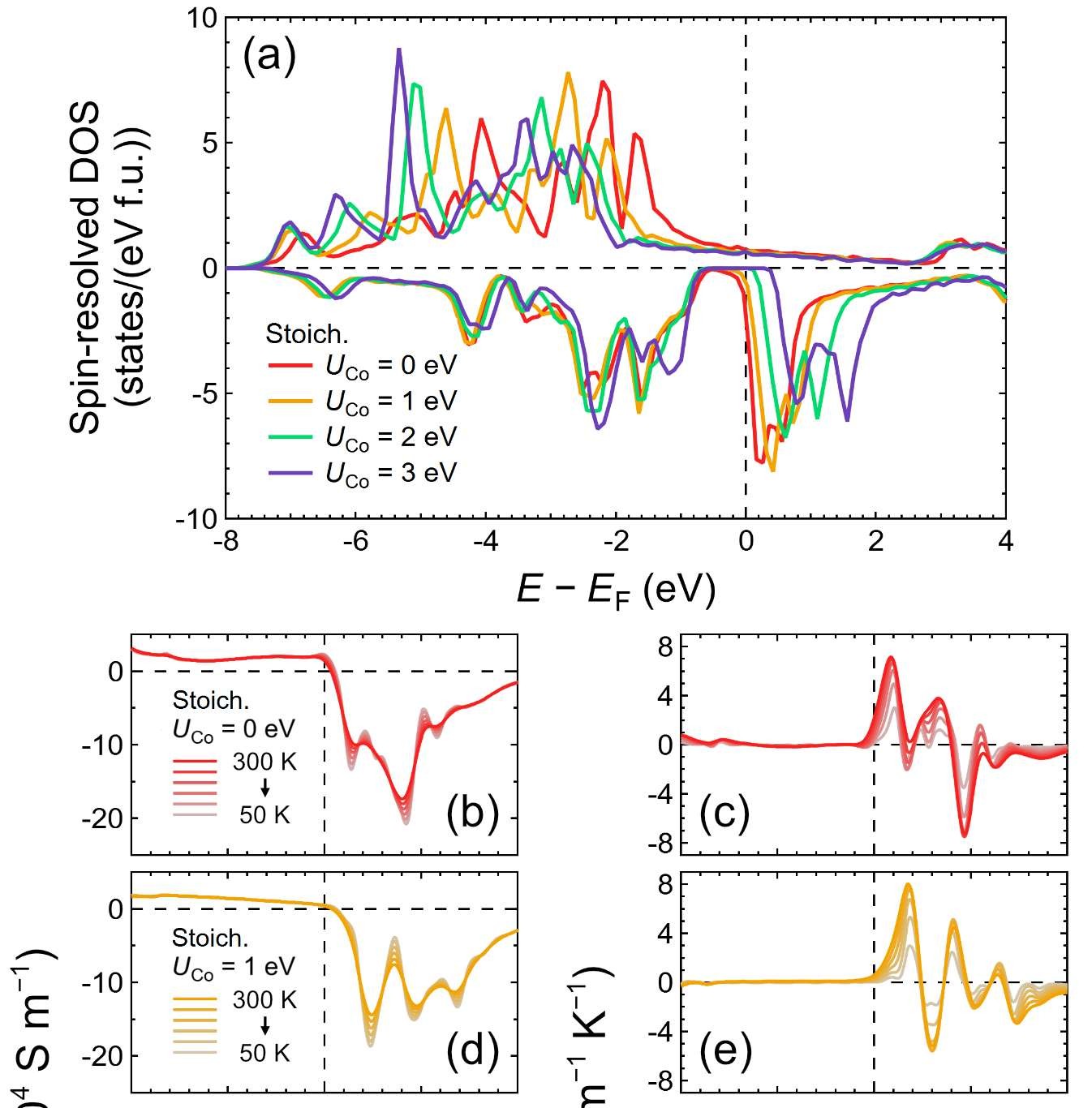


Figure S3. (a) Spin-resolved DOS values for Co2FeSi with stoichiometric (Stoich.) composition around the Fermi level (EF), with various values for the on-site Coulomb interaction at the Co site (UCo). (b) Calculated σxy values in the energy window of ±1 eV relative to EF with UCo = 0 eV, (d) UCo = 1 eV, (f) UCo = 2 eV, and (h) UCo = 3 eV. (c) Corresponding αxy values with UCo = 0 eV, (e) UCo = 1 eV, (g) UCo = 2 eV, and (i) UCo = 3 eV. The saturation of colors of the lines indicates the T values of the results, which ranged from 50 to 300 K in 50 K steps. The values of αxy and σxy at EF in (b)–(i) as functions of T are shown in Figure S4(a, b), respectively.

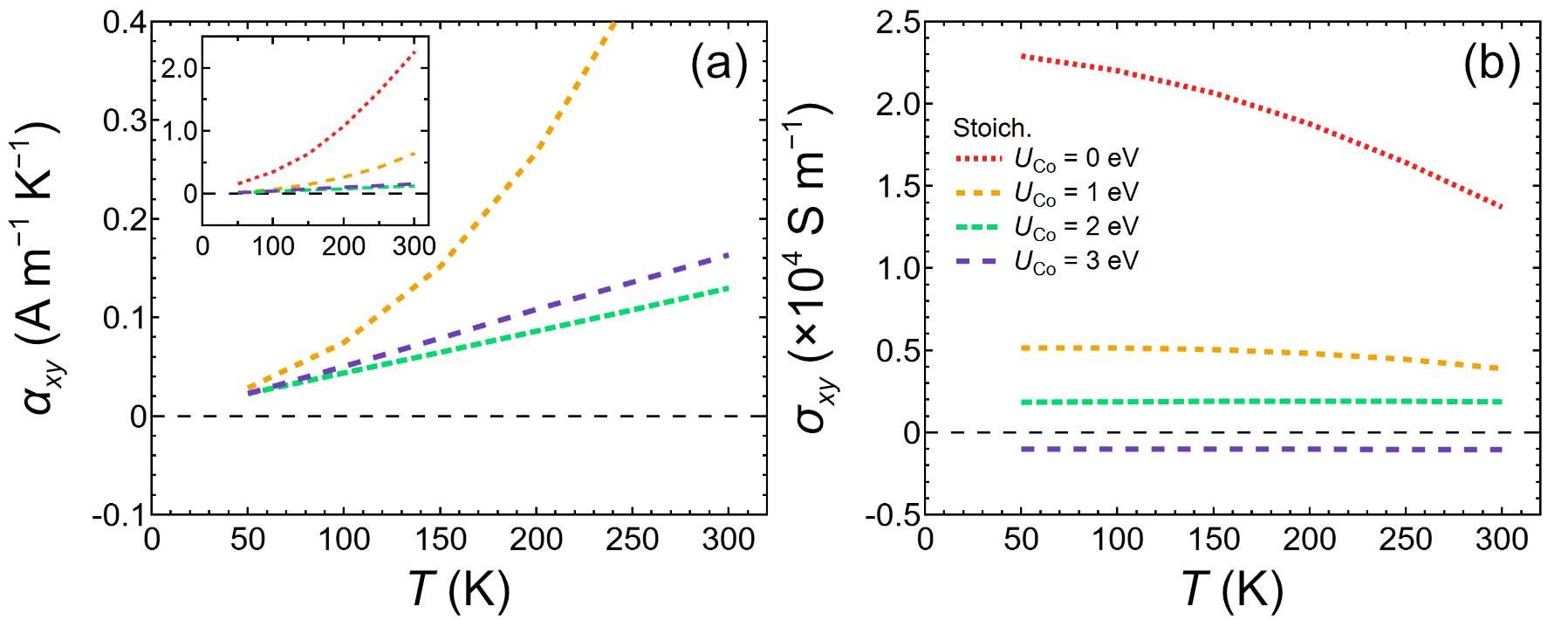


Figure S4. (a) αxy and (b) σxy values at EF of stoichiometric (Stoich.) Co2FeSi with various values for UCo. The inset of (a) shows the calculated results over a wider range for the y-axis. The legends in (b) also apply to (a).