Supporting Information

Engineering Interfacial Perpendicular Magnetic Anisotropy in Fe_2CoSi/Pt Multilayers with Interfacial Strain and Orbital Hybridization

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To prove that Pt layers in Pt/FCS multilayers are (111) oriented, we have measured the XRD for Si/SiO_2/Ta (3)/Pt (10)/[FCS (0.6)/Pt (t_{Pt})]$_9$/Ru with t_{Pt} = 0.6, 0.8 and 2 nm. Figure S1(a) shows that as the thickness of Pt reduces from 2 nm to 0.8 or 0.6 nm, the XRD intensity of Pt(111) and Pt/FCS peaks decreases significantly. This indicates that Pt(111) peak is contributed by both 10 nm Pt buffer and Pt layers in Pt/FCS multilayers. Moreover, the significant decrease in the intensity of Pt/FCS peak also suggests that Pt(111) phase in multilayer is crucial for inducing the multilayer phase. By plotting the XRD result in log scale as shown in Figure S1(b), we can easily see the peak positions of Pt/FCS for t_{Pt} = 0.6 and 0.8 nm.

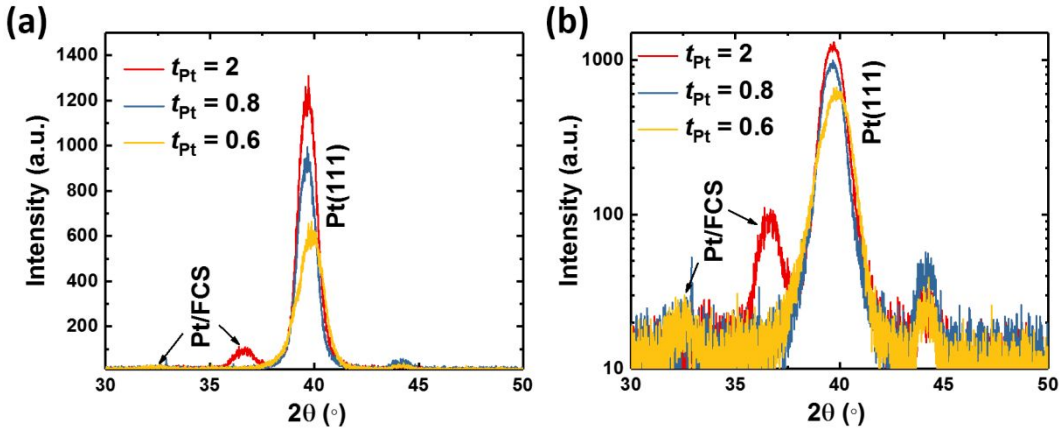

Figure S1. XRD θ - 2θ scans for the sample Si/SiO_2/Ta (3)/Pt (10)/[FCS (0.6)/Pt (t_{Pt})]$_9$/Ru, t_{Pt} = 0.6, 0.8 and 2 nm with intensity in (a) linear scale and (b) log scale, respectively. Thickness shown in parentheses of each layer is in nanometers.

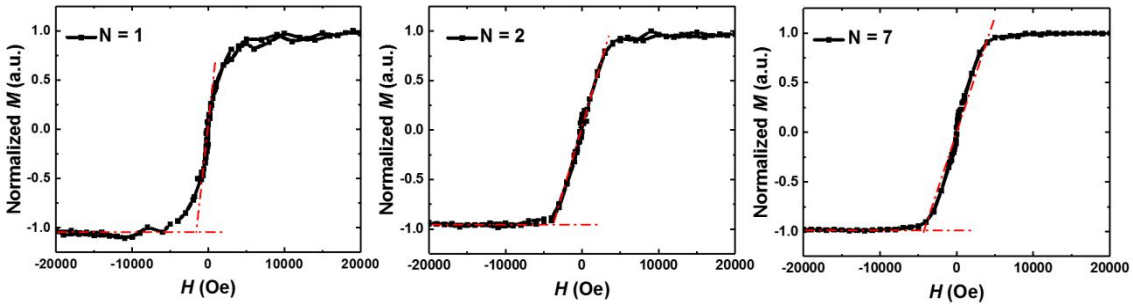

Figure S2. *M*-*H* loops along hard axis in the stack of Si/SiO_2/Ta (3)/Pt (10)/[FCS (0.6)/Pt (1.5)]$_n$/Ru (3), n = 1, 2 and 7. Thickness shown in parentheses of each layer is in nanometers.

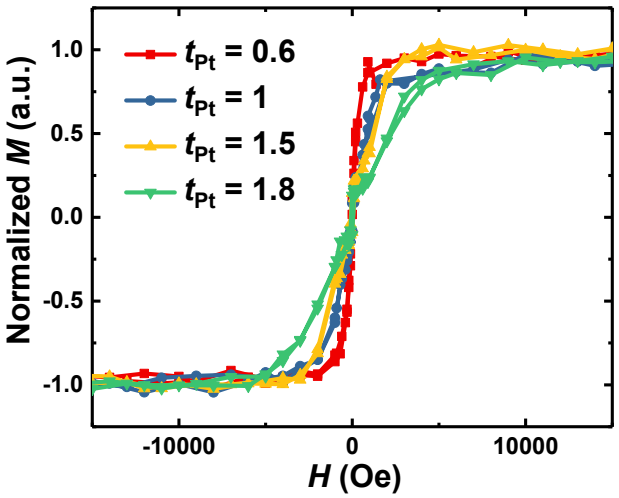

Figure S3. *M*-*H* loops along the hard axis in the stack of Si/SiO_2/Ta (3)/Pt (10)/[FCS (0.6)/Pt (t_{Pt})]$_2$/Ru (3), t_{Pt} = 1.6, 1, 1.5 and 1.8 nm. Thickness shown in parentheses of each layer is in nanometers.

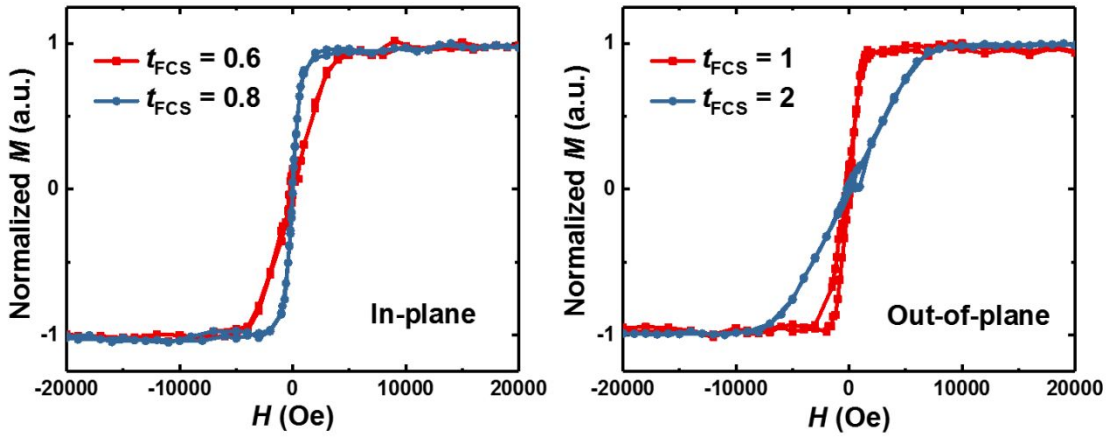

Figure S4. *M*-*H* loops along hard axis in the stack of Si/SiO_2/Ta (3)/Pt (10)/[FCS (t_{FCS})/Pt (1.5)]$_2$/Ru (3), t_{FCS} = 0.6, 0.8, 1 and 2 nm. Thickness shown in parentheses of each layer is in nanometers.