Supplementary Information

Tailoring ferromagnetic resonance properties of cobalt nanowires: Effects of shape and magnetocrystalline anisotropies

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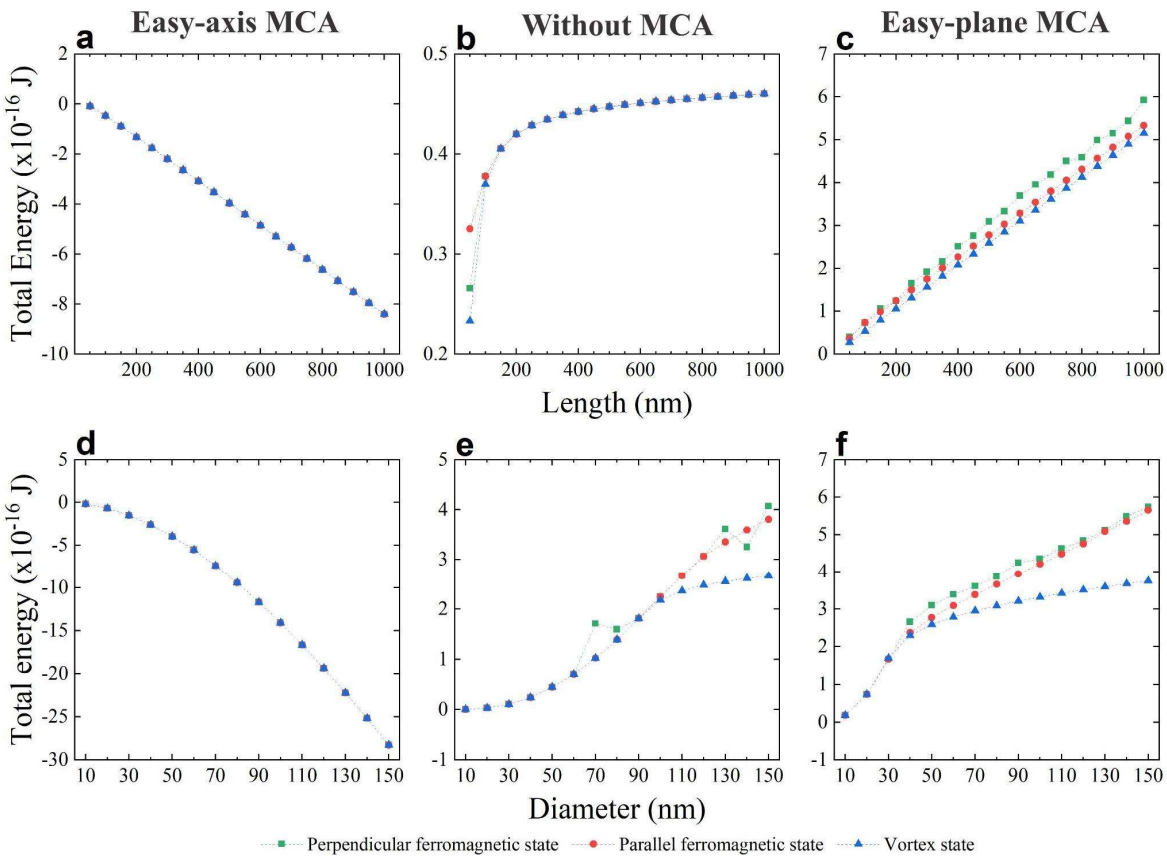

Fig. S-1 Total energy after the minimization process from various initial magnetic states for Co-NWs with an easy-axis MCA (a and d), without MCA (b and e), and with an easy-plane MCA (c and f), obtained as a function of their length for a fixed diameter of 50 nm (a, b and c), and as a function of their diameter for a fixed length of 500 nm (d, e and f).

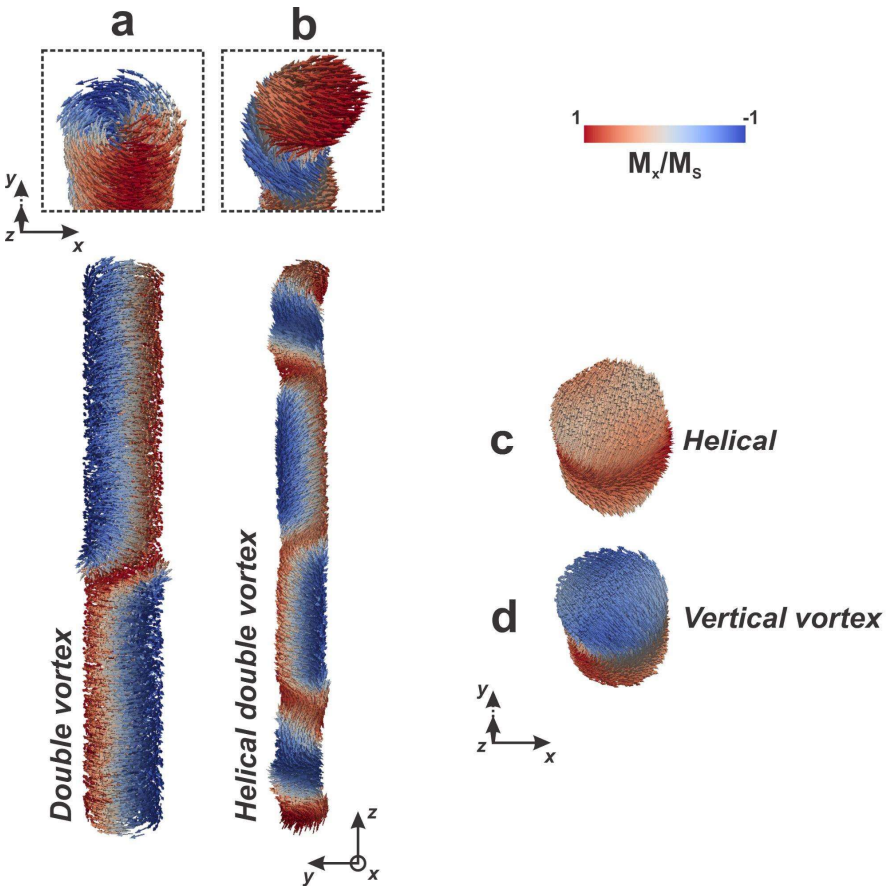

Fig. S-2 Representation of minimum-energy non-ground magnetic state configurations obtained for Co-NWs without MCA, with an easy-plane MCA, and with an easy-axis MCA: double vortex (a), helical double vortex (b), helical (c), and vertical vortex (d).

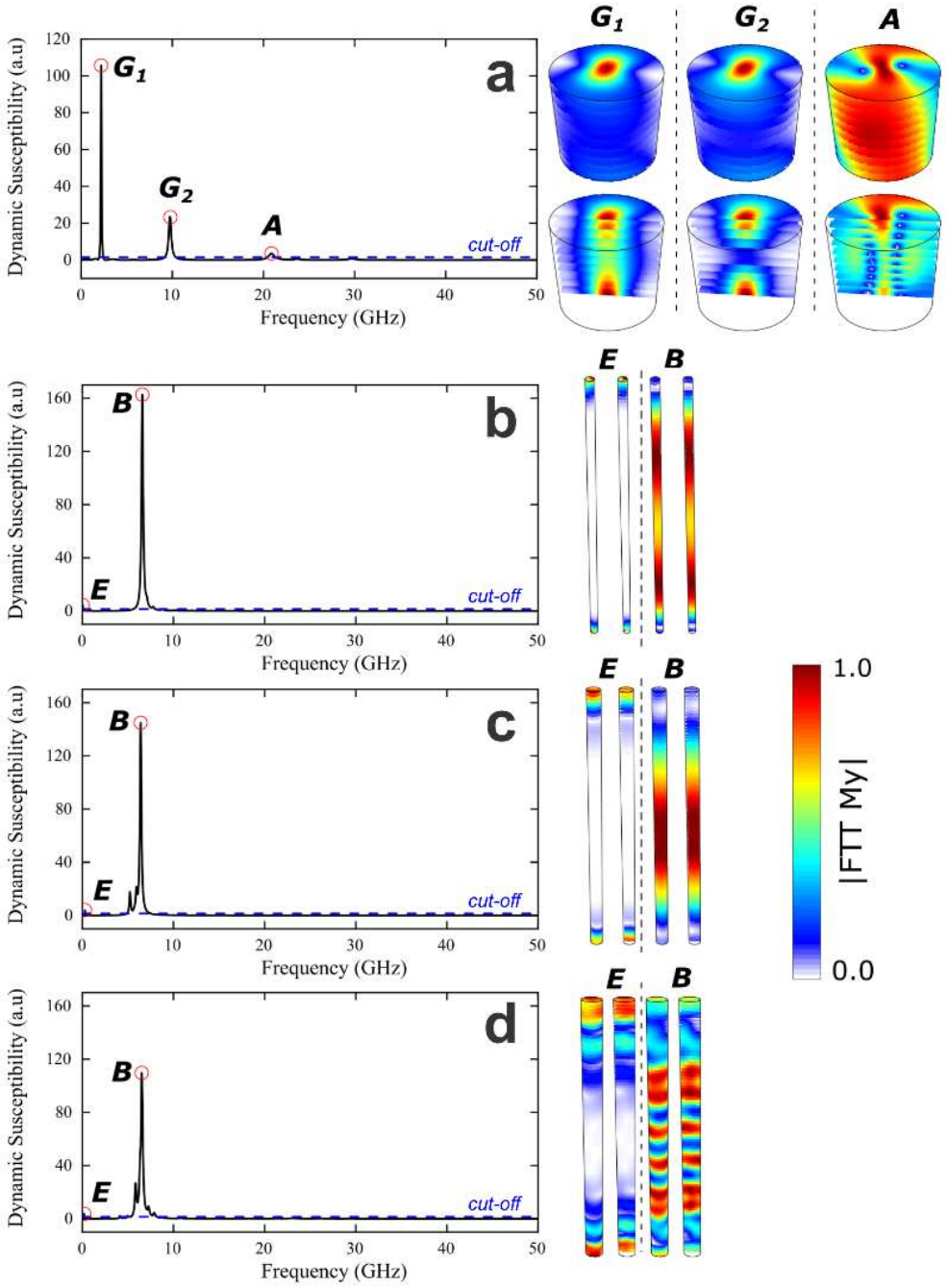

Fig. S-3 Dynamic susceptibility spectra and resonant modes representations of 50 nm length and diameter Co-NWs without MCA (a), and with an easy-plane MCA, featuring 500 nm length and diameters of 10 (b), 20 (b), and 30 nm (c). Each resonant mode is depicted with an external surface view and a longitudinal slice of the nanowire. The color code denotes the amplitude of the FFT applied to the y-component of the magnetization field. (Refer to the web version of this article for color interpretation in this figure legend)

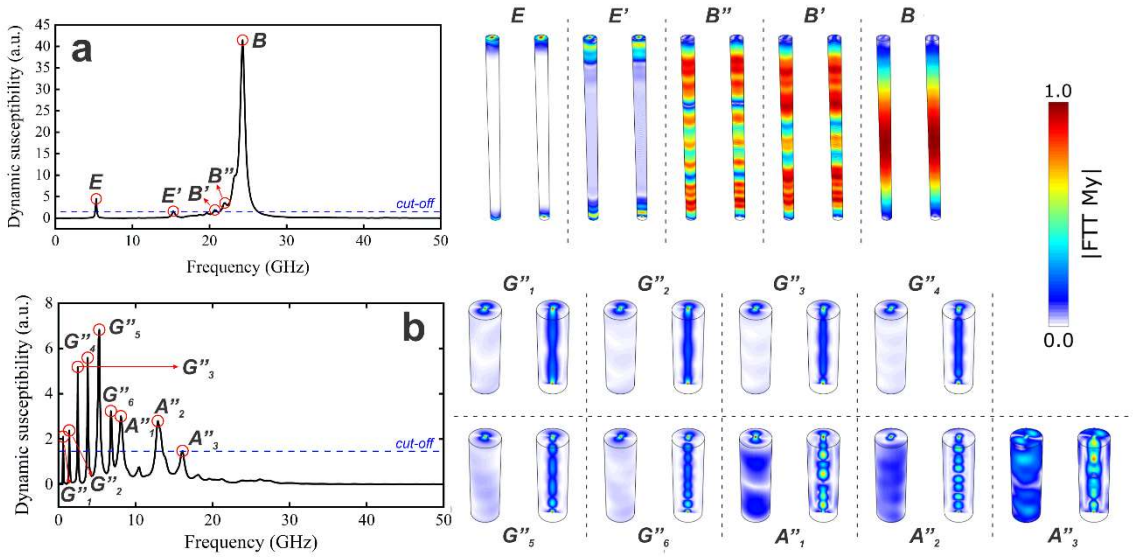

Fig. S-4 Dynamic susceptibility spectra and resonant mode representations of Co-NWs without MCA, featuring 50 nm diameter and 1 μm length (a), and 150 nm diameter and 500 nm length (b). Each resonant mode is depicted with an external surface view (left) and a longitudinal slice (right) of the nanowire. The color code indicates the amplitude of the FFT applied to the y-component of the magnetization field. (Refer to the web version of this article for color interpretation in this figure legend)

Table S-1 Magnetic state after the minimization process from various initial magnetic configurations for Co-NWs with an easy-axis MCA, without MCA, and with an easy-plane MCA, obtained as a function of their length for a fixed diameter of 50 nm.

Length	*Easy-plane* MCA			*Without* MCA			*Easy-axis* MCA		
	Ferro Z	**Ferro X**	**Vortex**	**Ferro Z**	**Ferro X**	**Vortex**	**Ferro Z**	**Ferro X**	**Vortex**
50	HL	HL	V	V	VV	V	F	F	F
100	DV	DV	V	TF	TF	TF	F	F	F
150	DV	DV	V	TF	TF	TF	F	F	F
200	DV	DV	V	TF	TF	TF	F	F	F
250	DV	DV	V	TF	TF	TF	F	F	F
300	DV	DV	V	TF	TF	TF	F	F	F
350	DV	DV	V	TF	TF	TF	F	F	F
400	DV	DV	V	TF	TF	TF	F	F	F
450	DV	DV	V	TF	TF	TF	F	F	F
500	DV	DV	V	TF	TF	TF	F	F	F
550	DV	DV	V	TF	TF	TF	F	F	F
600	DV	DV	V	TF	TF	TF	F	F	F
650	DV	DV	V	TF	TF	TF	F	F	F
700	DV	DV	V	TF	TF	TF	F	F	F
750	DV	DV	V	TF	TF	TF	F	F	F
800	DV	DV	V	TF	TF	TF	F	F	F
850	DV	DV	V	TF	TF	TF	F	F	F
900	DV	DV	V	TF	TF	TF	F	F	F
950	DV	DV	V	TF	TF	TF	F	F	F
1000	DV	DV	V	TF	TF	TF	F	F	F

F: Flower; TF: Twisted flower; V: Vortex; DV: Double vortex; HL: Helical; VV: Vertical vortex.

Table S-2 Magnetic state after the minimization process from various initial magnetic configurations for Co-NWs with an easy-axis MCA, without MCA, and with an easy-plane MCA, obtained as a function of their diameter for a fixed length of 500 nm.

Diameter	*Easy-plane* MCA			*Without* MCA			*Easy-axis* MCA		
	Ferro Z	**Ferro X**	**Vortex**	**Ferro Z**	**Ferro X**	**Vortex**	**Ferro Z**	**Ferro X**	**Vortex**
10	T	T	T	F	F	F	F	F	F
20	T	T	T	F	F	F	F	F	F
30	H	H	TF	F	F	F	F	F	F
40	DV	HDV	V	F	F	F	F	F	F
50	DV	DV	V	TF	TF	TF	F	F	F
60	DV	DV	V	TF	TF	TF	F	F	F
70	DV	DV	V	TF	TF	TF	F	F	F
80	DV	DV	V	TF	TF	TF	F	F	F
90	DV	DV	V	TF	TF	TF	F	F	F
100	DV	DV	V	DV	TF	V	F	F	F
110	DV	DV	V	DV	DV	V	F	F	F
120	DV	DV	V	DV	DV	V	F	F	F
130	DV	DV	V	DV	DV	V	F	F	F
140	DV	DV	V	DV	DV	V	F	F	F
150	DV	DV	V	DV	DV	V	F	F	F

F: Flower; TF: Twisted flower; V: Vortex; T: Transversal flower; H: Helical flower; DV: Double vortex; HDV: Helical double vortex.