SUPPLEMENTAL MATERIAL

Er-driven magnetic tunability in FePt thin films investigated via high-throughput experiments and microstructure analysis for future HAMR media

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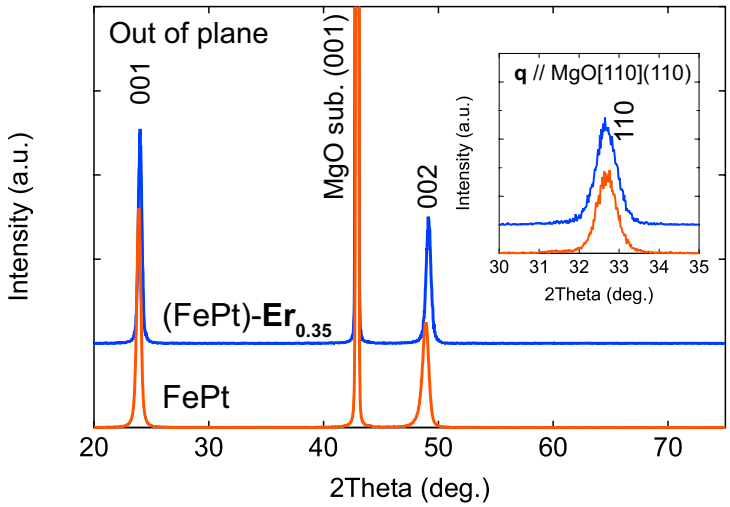

FIG. S1. Out-of-plane XRD patterns of FePt thin films without Er and with a 0.35 at.% Er addition. The inset shows the (110) peaks of the $L1_0$-FePt for both films, where the (110) peaks were measured with the scattering vector **q** aligned parallel to subsgrate of MgO[110](110).

TABLE S1: The additive elements, sputtering power input for each target, deposition time, and deposition position as shown in Fig. 1(a), x and y in the composition formula $(Fe_xPt_{100-x})_{100-y}X_y$ (X = Er, Tm) as estimated by XRF, film thickness as estimated by XRR, lattice constant c as estimated by XRD, $L1_0$ ordering parameter, M_s as measured by VSM, T_c as estimated by SQUID-VSM, and H_k as estimated by dynacool were listed for each sample respectively.

ID	X	Power [W]			time	posi.	$(Fe_xPt_{100-x})_{100-y}X_y$		Thickness	Crystal structure		Magnetic properties		
		Fe	Pt	X	[sec]	No.	x	y	t [nm]	c [nm]	S	M_s [T]	T_c [K]	H_k [T]
1	-	40	15	0	1800	11	50.76	0.00	30.241	0.3724	0.9264	1.394	679.27	10.00
2	Er	150	56	5	480	5	47.50	0.19	34.273	0.3746	0.5024	1.402		
3	Er	150	56	5	480	2	59.62	0.24	32.657	0.3751	0.4557	1.410		
4	Er	60	23	5	1200	11	54.72	0.30	32.204	0.3705	0.9284	1.529		
5	Er	60	23	5	1200	8	51.44	0.35	31.471	0.3707	0.9557	1.536	715.55	11.80
6	Er	40	15	5	1800	11	56.20	0.46	30.637	0.3711	0.9013	1.447		10.45
7	Er	40	15	5	1800	8	49.57	0.53	29.566	0.3715	0.9584	1.503	688.44	10.13
8	Er	40	15	10	1800	11	51.98	0.91	32.086	0.3711	0.8367	1.359		
9	Er	40	15	10	1800	8	52.61	1.05	31.605	0.3713	0.816	1.367	667.95	10.04
10	Er	40	15	10	1800	5	49.00	1.42	29.359	0.3777	0.3423	1.128		2.60
11	Er	40	15	10	1800	2	45.41	1.80	27.925	0.3766	0.4557	1.120	579.1	5.88
12	Er	40	15	20	1800	11	52.32	1.80	32.104	0.3753	0.4015	1.136		
13	Er	40	15	20	1800	8	55.70	2.08	30.812	0.3775	0.3102	1.278		
14	Er	40	15	20	1800	5	38.53	2.81	30.388	0.3797	0.384	0.992	585.68	6.43
15	Er	40	15	20	1800	2	49.08	3.53	29.325	0.3819	0.3506	0.878	556.83	6.28
16	Tm	150	56	5	640	11	55.42	0.19	48.187	0.3724	0.5757	1.174		
17	Tm	150	56	5	640	8	57.47	0.24	47.017	0.3744	0.4355	1.104		
18	Tm	150	56	5	640	5	47.88	0.24	44.779	0.3716	0.9616	1.323		
19	Tm	150	56	5	640	2	53.95	0.31	42.711	0.371	0.9207	1.311		
20	Tm	40	15	5	2400	11	52.82	0.71	39.656	0.3716	0.9101	1.334	703.09	

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Table S1 continued from previous page

ID	X	Power [W]			time	posi.	$(Fe_xPt_{100-x})_{100-y}X_y$		Thickness	Crystal structure		Magnetic properties		
		Fe	Pt	X	[sec]	No.	x	y	t [nm]	c [nm]	S	M_s [T]	T_c [K]	H_k [T]
21	Tm	40	15	5	2400	8	56.14	0.88	38.47	0.3728	0.6584	1.278		
22	Tm	40	15	5	2400	5	48.05	0.88	37.104	0.3752	0.7616	1.158		
23	Tm	40	15	5	2400	2	47.78	1.15	35.358	0.3744	0.7471	1.170		
24	Tm	40	15	10	2400	11	53.52	1.42	40.79	0.3727	0.7443	1.278		
25	Tm	40	15	10	2400	8	53.49	1.74	40	0.3726	0.6715	1.248		9.79
26	Tm	40	15	10	2400	5	51.93	1.75	38.471	0.3757	0.5771	1.136		
27	Tm	40	15	10	2400	2	46.17	2.28	35.854	0.3755	0.5391	1.177		6.28
28	Tm	40	15	20	2400	11	55.20	2.79	41.744			0.603		
29	Tm	40	15	20	2400	8	53.96	3.43	41.339			0.780		
30	Tm	40	15	20	2400	5	51.35	3.44	41.263			0.644		
31	Tm	40	15	20	2400	2	48.35	4.46	39.543	0.383	0.3757	0.482		