Supplementary Material to the article
"Study of multiferroics $SmFe_{3-x}Al_x(BO_3)_4$ (x = 0 – 0.28) by ^{57}Fe Mössbauer spectroscopy"

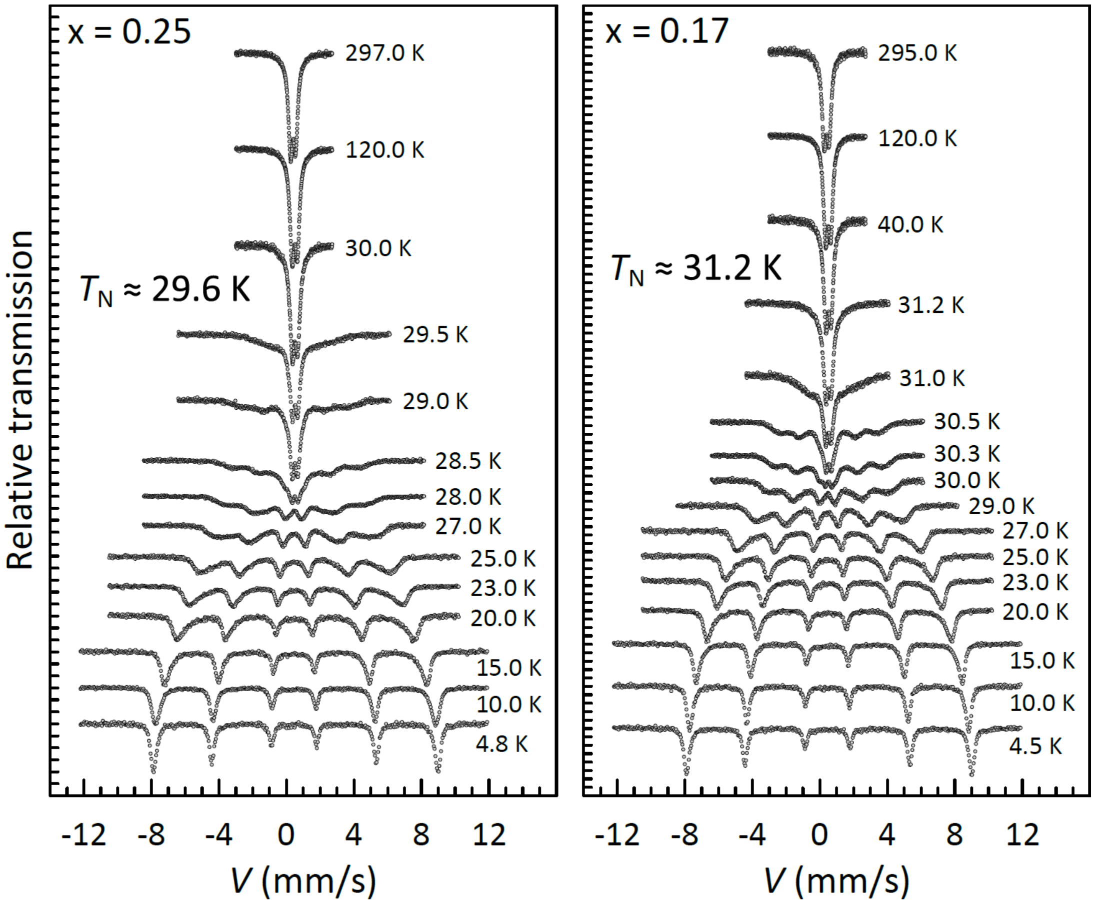

Fig. S1. Mössbauer spectra of $SmFe_{3-x}Al_x(BO_3)_4$ samples (x = 0.17 and 0.25) measured at different temperatures. T_N – Neel temperature of the magnetic phase transition.

Table S1. Hyperfine and model parameters calculated from Mössbauer spectra of the $SmFe_{3-x}Al_x(BO_3)_4$ samples measured at temperatures below the magnetic phase transition point T_N.

				x = 0.07					
T (K)	Components	δ (mm/s)	ε (mm/s)	Δ (mm/s)	B_{hf} (T)	$ln(R)$	p	Γ (mm/s)	A (%)
3.8	S	0.502(1)	0.050(1)	–	53.25(5)	13.67	0.443	0.301	100.0
4.8	S	0.502(1)	0.052(1)	–	53.01(5)	13.15	0.391	0.349	100.0
7	S	0.501(1)	0.051(1)	–	52.68(4)	12.92	0.386	0.326	100.0
10	S	0.503(1)	0.052(1)	–	51.87(3)	12.56	0.400	0.317	100.0
15	S	0.501(1)	0.049(1)	–	49.62(3)	12.47	0.517	0.334	100.0
20	S	0.503(1)	0.052(1)	–	45.96(3)	12.68	0.620	0.380	100.0
23	S	0.506(1)	0.052(1)	–	42.96(4)	13.34	0.714	0.351	100.0
25	S1	0.508(1)	0.051(1)	–	39.60(1)	13.40	0.967	0.337	82.5
	S2	0.511(20)	0.068(19)	–	39.60(1)	2.31	0.658	0.200	17.5
27	S1	0.506(1)	0.051(1)	–	36.75(3)	12.79	0.831	0.303	82.3
	S2	0.502(4)	0.061(4)	–	34.48(9)	0.00	0.340	0.360	13.4
	D	0.386(10)	–	0.500(9)	–	–	–	0.500	4.3
29	S1	0.506(1)	0.052(2)	–	31.88(5)	13.90	0.886	0.315	82.7
	S2	0.506(5)	0.073(5)	–	28.60(10)	0.00	0.513	0.380	12.2
	D	0.463(9)	–	0.500(7)	–	–	–	0.500	5.1
30	S1	0.506(1)	0.052(1)	–	28.19(5)	14.19	0.910	0.289	82.4
	S2	0.504(4)	0.071(4)	–	24.34(6)	0.00	0.681	0.310	11.7
	D	0.501(7)	–	0.500(6)	–	–	–	0.500	5.9

31	S1	0.499(2)	0.058(2)	–	23.10(11)	14.50	0.928	0.290	41.5
	S2	0.499(3)	0.054(3)	–	19.58(10)	0.00	0.932	0.504	52.7
	D	0.500(5)	–	0.568(5)	–	–	–	0.494	5.8
31.5	S1	0.492(3)	0.064(2)	–	17.10(10)	14.95	0.948	0.408	65.2
	D	0.511(1)	–	0.344(1)	–	–	–	0.388	34.8
31.8	S1	0.488(4)	0.058(6)	–	11.32(27)	16.17	1.000	0.611	62.4
	D	0.511(1)	–	0.318(1)	–	–	–	0.309	37.6
32	S1	0.480(9)	0.028(29)	–	8.02(1)	18.20	0.982	0.583	32.4
	D	0.510(1)	–	0.303(1)	–	–	–	0.316	67.6
x = 0.17									
T (K)	Components	δ (mm/s)	ε (mm/s)	Δ (mm/s)	B_{hf} (T)	$ln(R)$	p	Γ (mm/s)	A (%)
4.5	S	0.502(1)	0.052(1)	–	52.98(5)	12.95	0.416	0.284	100.0
10	S	0.500(1)	0.050(1)	–	51.71(3)	12.01	0.416	0.277	100.0
15	S	0.501(1)	0.050(1)	–	49.50(3)	12.05	0.568	0.268	100.0
20	S	0.506(1)	0.051(1)	–	45.81(2)	12.50	0.703	0.288	100.0
23	S	0.507(1)	0.053(1)	–	42.61(3)	13.08	0.782	0.293	100.0
25	S1	0.504(3)	0.050(3)	–	40.16(5)	12.54	0.881	0.210	64.7
	S2	0.504(4)	0.051(4)	–	38.13(5)	0.00	0.606	0.356	35.3
27	S1	0.507(2)	0.049(2)	–	36.23(5)	12.85	0.901	0.200	66.1
	S2	0.502(4)	0.058(4)	–	33.79(6)	0.00	0.738	0.367	33.9
29	S1	0.504(3)	0.056(3)	–	30.95(10)	14.45	0.932	0.211	66.1
	S2	0.496(5)	0.060(4)	–	26.78	0.00	0.873	0.353	33.9
30	S1	0.503(3)	0.047(3)	–	26.36(11)	15.09	0.950	0.226	66.1
	S2	0.515(9)	0.072(7)	–	20.94(16)	0.00	0.940	0.583	33.9
30.2	S1	0.505(4)	0.061(4)	–	25.03(19)	13.84	0.979	0.255	65.9
	S2	0.504(4)	0.045(4)	–	22.76(17)	14.68	0.932	0.286	33.1
	D	0.494(5)	–	0.444(6)	–	–	–	0.200	1.0
30.3	S1	0.500(5)	0.057(5)	–	24.79(16)	13.59	0.990	0.215	65.6
	S2	0.505(4)	0.056(4)	–	21.01(5)	0.00	0.882	0.355	27.0
	D	0.512(3)	–	0.404(3)	–	–	–	0.330	7.4
30.5	S1	0.499(5)	0.053(5)	–	22.91(18)	14.70	0.964	0.230	49.3
	S2	0.506(6)	0.046(6)	–	18.24(12)	0.00	0.850	0.498	23.7
	D	0.511(1)	–	0.334(1)	–	–	–	0.350	27.0
30.6	S1	0.505(4)	0.056(4)	–	22.47(17)	15.34	0.959	0.222	42.2
	S2	0.493(5)	0.063(5)	–	17.03(10)	0.00	0.882	0.519	27.4
	D	0.508(1)	–	0.328(1)	–	–	–	0.335	30.4
30.8	S1	0.489(5)	0.061(4)	–	19.32(19)	15.90	0.959	0.285	44.2
	S2	0.527(11)	0.070(8)	–	12.94(24)	0.00	0.811	0.745	22.1
	D	0.510()	–	0.334(1)	–	–	–	0.334	33.8
31	S1	0.509(5)	0.091(5)	–	13.01(10)	0.00	0.969	0.709	70.1
	D	0.509(1)	–	0.330(1)	–	–	–	0.296	29.9
31.1	S1	0.500(5)	0.098(7)	–	10.77(18)	0.00	1.000	0.662	56.4
	D	0.509(1)	–	0.322(1)	–	–	–	0.312	43.6
31.2	S1	0.476(9)	0.077(14)	–	7.79(25)	0.00	1.000	0.565	30.3
	D	0.509(1)	–	0.315(1)	–	–	–	0.325	69.7
x = 0.25									
T (K)	Components	δ (mm/s)	ε (mm/s)	Δ (mm/s)	B_{hf} (T)	$ln(R)$	p	Γ (mm/s)	A (%)
4.8	S	0.501(1)	0.050(1)	–	52.89(4)	12.85	0.447	0.286	100.0
10	S	0.499(1)	0.050(1)	–	51.36(2)	10.94	0.470	0.307	100.0
15	S	0.499(1)	0.049(1)	–	48.80(1)	11.37	0.640	0.302	100.0
20	S	0.504(1)	0.049(1)	–	45.01(4)	12.84	0.810	0.320	100.0
23	S	0.505(2)	0.052(2)	–	41.26(4)	13.43	0.877	0.322	100.0
25	S1	0.502(4)	0.047(2)	–	38.02(8)	13.93	0.851	0.299	47.3
	S2	0.500(4)	0.056(4)	–	36.45(40)	15.02	0.936	0.280	52.7

26	S1	0.505(3)	0.046(2)	–	36.17(9)	14.34	0.892	0.291	50.1
	S2	0.493(4)	0.048(4)	–	33.44(30)	15.00	0.941	0.263	49.9
27	S1	0.510(3)	0.044(3)	–	34.30(10)	14.88	0.936	0.193	48.1
	S2	0.493(4)	0.058(4)	–	31.70(40)	16.39	0.945	0.375	51.9
28	S1	0.506(3)	0.055(3)	–	30.48(11)	14.82	0.954	0.237	49.4
	S2	0.508(6)	0.052(5)	–	26.32(40)	15.24	0.967	0.237	35.9
	S3	0.494(50)	0.039(7)	–	18.29(17)	0.00	0.891	0.494	14.7
28.5	S1	0.513(6)	0.060(6)	–	26.99(40)	15.40	0.922	0.575	50.0
	S2	0.577(16)	0.013(18)	–	17.49(1)	17.10	0.963	1.060	30.6
	D	0.500(3)	–	0.363(3)	–	–	–	0.377	19.4
29	S1	0.499(10)	0.057(9)	–	24.11(17)	2.80	0.953	0.494	49.3
	S2	0.495(10)	0.017(11)	–	20.22(17)	1.67	0.907	0.276	14.7
	D	0.507(1)	–	0.318(2)	–	–	–	0.346	36.0
29.5	S1	0.527(13)	0.076(12)	–	16.27(20)	1.60	0.958	0.842	50.9
	D	0.506(1)	–	0.333(1)	–	–	–	0.333	49.1

x = 0.28

T (K)	Components	δ (mm/s)	ε (mm/s)	Δ (mm/s)	B_{hf} (T)	*ln*(*R*)	*p*	Γ (mm/s)	*A* (%)
4.8	S	0.499(1)	0.055(1)	–	52.71(4)	12.76	0.482	0.257	100.0
5.0	S	0.499(1)	0.053(1)	–	52.61(2)	12.47	0.466	0.262	100.0
10.0	S	0.498(1)	0.053(1)	–	50.92(2)	10.84	0.560	0.269	100.0
15.0	S	0.496(1)	0.048(1)	–	48.01(2)	8.50	0.736	0.277	100.0
20.0	S1	0.508(2)	0.051(2)	–	43.86(6)	12.67	0.787	0.251	45.7
	S2	0.505(3)	0.057(3)	–	41.47(6)	5.00	0.889	0.237	54.3
23.0	S1	0.505(3)	0.052(3)	–	39.73(14)	13.63	0.896	0.263	45.5
	S2	0.491(5)	0.053(5)	–	37.15(40)	13.10	0.932	0.195	36.6
	S3	0.515(7)	0.047(7)	–	34.14(15)	2.07	0.832	0.357	17.9
25.0	S1	0.502(5)	0.046(5)	–	35.62(2)	14.77	0.947	0.195	45.4
	S2	0.497(5)	0.060(5)	–	32.24(31)	15.28	0.911	0.327	36.3
	S3	0.522(7)	0.080(7)	–	24.65(21)	11.00	0.900	0.319	18.3
26.0	S1	0.494(8)	0.046(7)	–	32.54(26)	15.95	0.958	0.277	45.2
	S2	0.503(6)	0.050(6)	–	24.59(24)	14.53	0.950	0.277	37.3
	S3	0.484(8)	0.035(8)	–	19.03(12)	0.87	0.903	0.384	17.5
26.5	S1	0.498(12)	0.069(12)	–	30.50(40)	15.62	0.987	0.233	45.5
	S2	0.512(11)	0.051(8)	–	17.15(18)	4.14	0.966	0.882	53.4
	D	0.486(6)	–	0.500(7)	–	–	–	0.200	1.1
26.8	S1	0.531(18)	0.120(17)	–	30.07(40)	13.80	1.000	0.300	45.1
	S2	0.527(27)	0.110(26)	–	16.26(1.30)	14.70	0.995	0.602	24.9
	D	0.507(1)	–	0.349(1)	–	–	–	0.298	30.0
27.0	S1	0.474(19)	0.079(19)	–	27.31(29)	0.00	1.000	0.543	53.0
	D	0.508(1)	–	0.339(1)	–	–	–	0.311	47.0
27.2	S1	0.505(21)	0.068(34)	–	23.27(21)	–	–	1.224	35.5
	D	0.506(1)	–	0.332(1)	–	–	–	0.319	64.5
27.3	S1	0.483(14)	0.109(23)	–	22.64(12)	–	–	1.119	23.3
	D	0.506(1)	–	0.328(1)	–	–	–	0.313	76.7
27.5	S1	0.460(14)	0.058(23)	–	21.60(12)	–	–	1.044	25.6
	D	0.506(1)	–	0.329(1)	–	–	–	0.304	74.4
27.7	S1	0.516(16)	0.135(25)	–	20.25(10)	–	–	1.078	23.6
	D	0.506(1)	–	0.328(1)	–	–	–	0.305	76.4
28.0	S1	0.596(47)	0.320(74)	–	14.66(56)	–	–	1.873	24.1
	D	0.506(1)	–	0.330(1)	–	–	–	0.309	75.9

δ – isomer shift, ε – quadrupole shift of the internal spectral lines in the Zeeman sextet, Δ – quadrupole splitting of the paramagnetic doublet, B_{hf} – hyperfine magnetic field at the ^{57}Fe nucleus, *ln(R)* – natural logarithm of the relaxation rate (parameter of the MSR model), *p* – ratio of the populations of successive (adjacent) atomic Zeeman levels (parameter of the MSR model), Γ – width of the spectral line, *A* – the relative area of the component.