Supporting Information

Tunable Physical Properties in BiAl$_{1-x}$Mn$_x$O$_3$ Thin Films with Novel Layered Supercell Structures

Shikhar Misra,[a] Leigang Li,[a,] Xingyao Gao,[a] Jie Jian,[a] Zhimin Qi[a], Dmitry Zemlyanov[b], Haiyan Wang[a,c,*]

[a]School of Materials Engineering, Purdue University, West Lafayette, Indiana 47907, United States
[b]Birck Nanotechnology Center, Purdue University, West Lafayette, Indiana 47907, United States
[c]School of Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana 47907, United States

Target Mn%	Film Mn%	Bi	Al	Mn	Sr	Ti	O
33	40	8.51	4.49	2.84	12.19	13.94	58.03
50	55	8.82	3.09	3.75	12.24	13.91	58.19
67	67	6.37	1.82	3.78	13.56	14.88	59.59
80	80	8.17	1.24	5.21	12.89	14.15	58.33

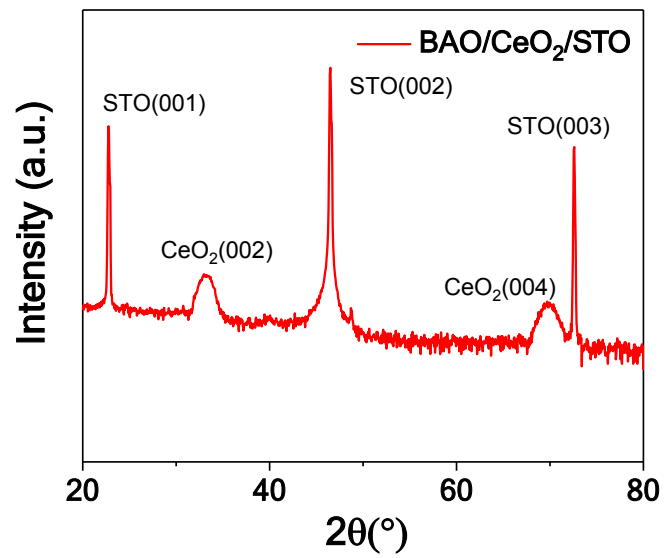**Table S1.** Composition of the film calculated using EDS in SEM.
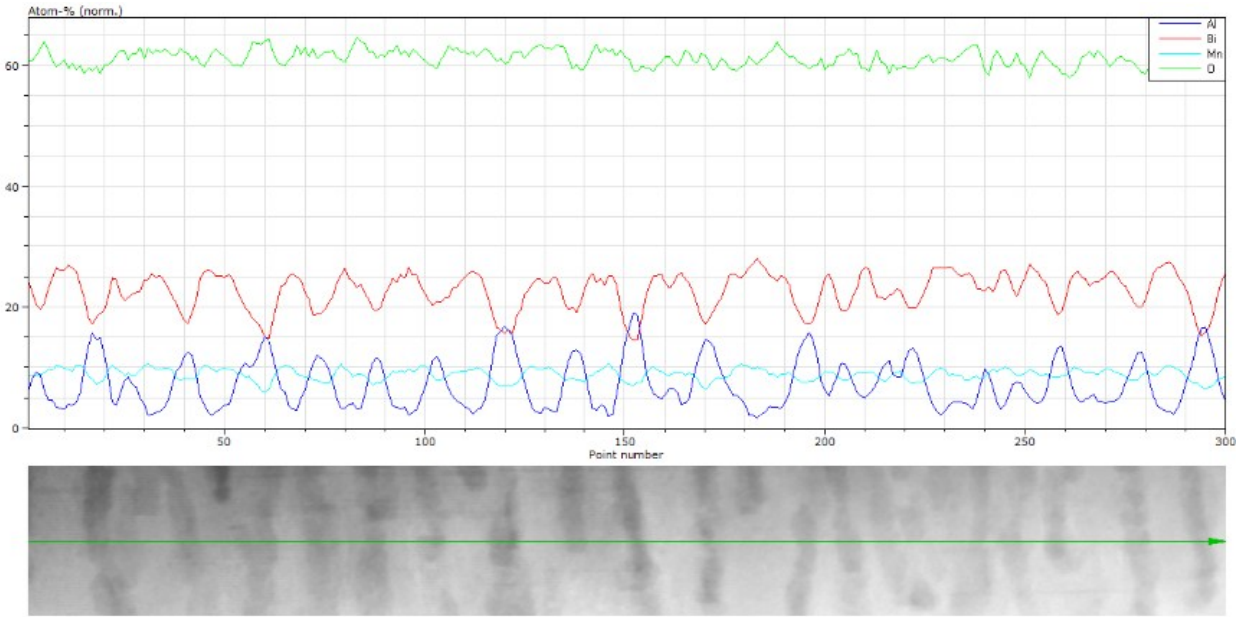
Figure S1. XRD of BAO film deposited on CeO_2 buffered STO

Figure S2. A line scan across the pillars, showing the pillar to be *Al-rich*, formed within the $BA_{1-x}M_xO$ (x=0.67) matrix.
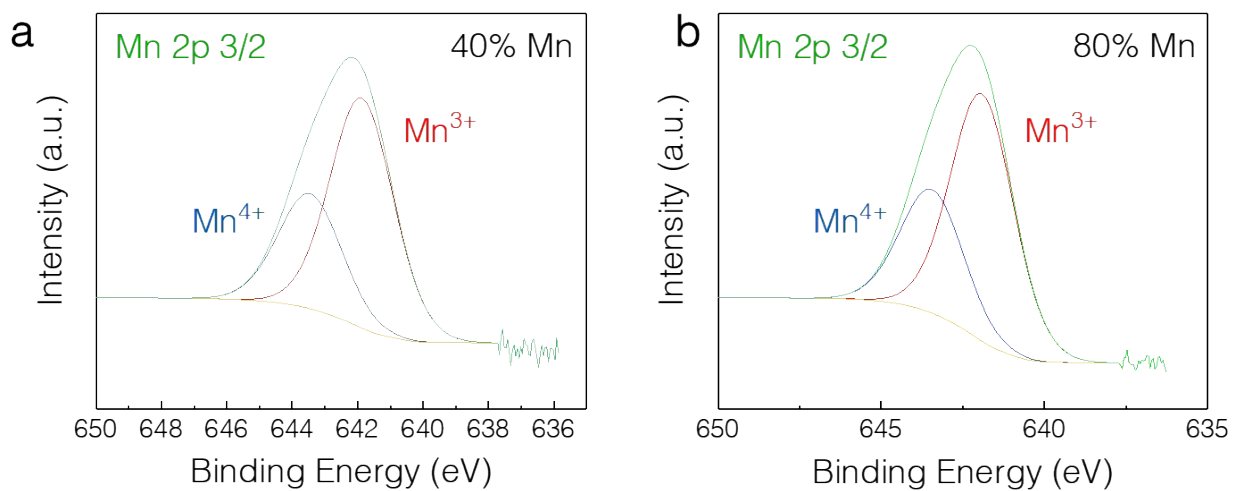
Figure S3. XPS analysis of two extreme composition (a) x=0.4 and (b) x=0.8 showing the two possible Mn^{3+} and Mn^{4+} oxidation states.
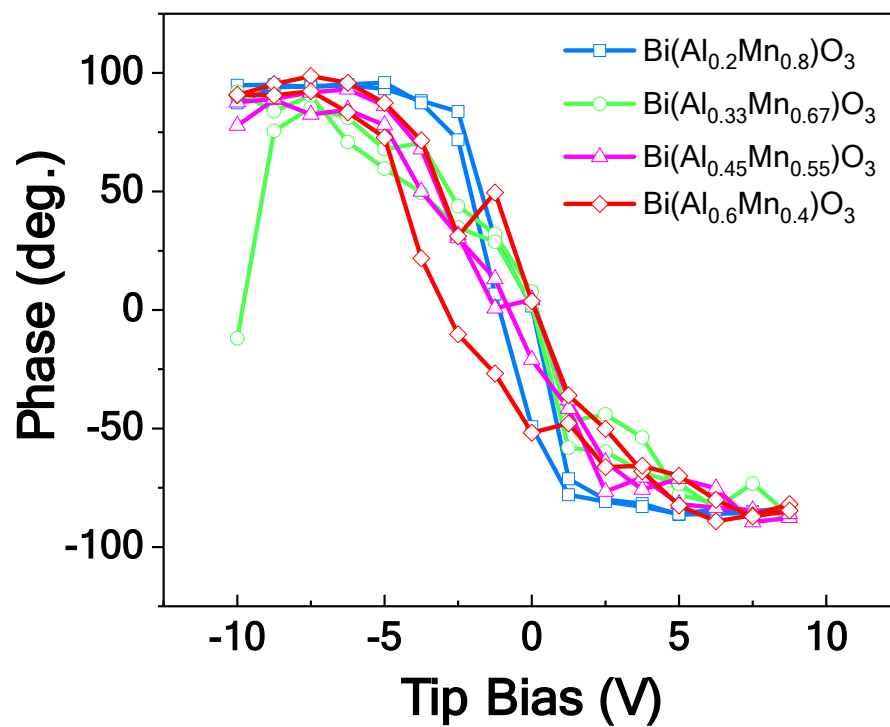
Figure S4. PFM phase hysteresis loops for all the different thin films.