

Electronic Supplementary Materials

Entanglement of cation ordering and manipulation of the magnetic properties through temperature controlled topotactic interface reaction in nanocomposite perovskite oxides

Sudipa Bhattacharya¹, Radhamadhab Das¹, Shreyashi Chowdhury¹, Supin K K^{2,3}, M. Vasundhara^{2,3*}, Jyoti Ranjan Sahu⁴, Trilochan Bhunia⁵, Arup Gayen⁵, Oleg I. Lebedev⁶ and Md. Motin Seikh^{1,*}

¹*Department of Chemistry, Visva-Bharati University, Santiniketan–731235, West Bengal, India*

²*Polymers and Functional Materials Department, CSIR-Indian Institute of Chemical Technology, Hyderabad-500007, India*

³*Academy of Scientific and Innovative Research (AcSIR), Ghaziabad-201002, India.*

⁴*P.G. Department of Physics, Maharaja Sriram Chandra Bhanja Deo University, Baripada-757003, India*

⁵*Department of Chemistry, Jadavpur University, Kolkata 700032, India*

⁶*Laboratoire CRISMAT, ENSICAEN UMR6508, 6 Bd Maréchal Juin, Cedex 4, Caen-14050, France*

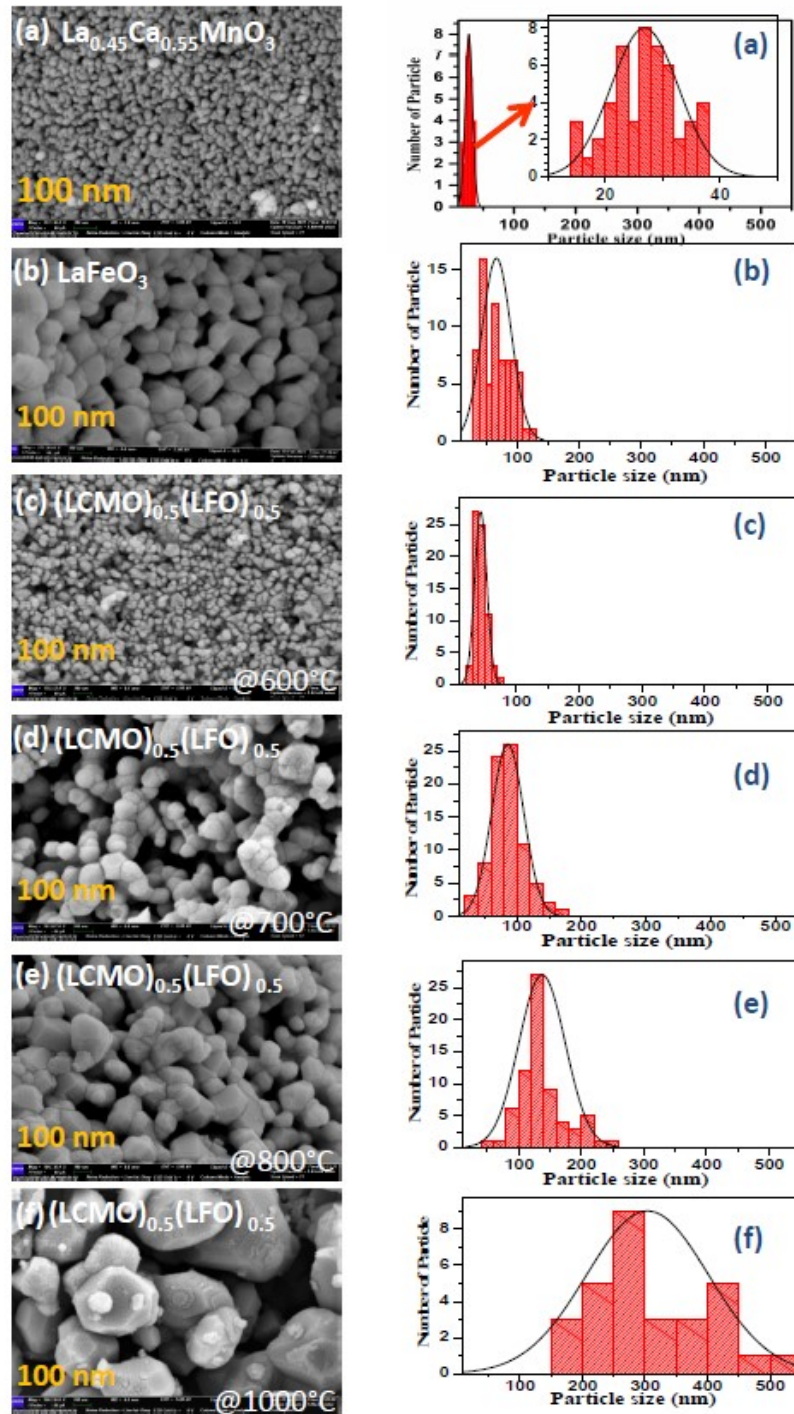


Fig. S1: FE-SEM images and particle size histogram for (a) $\text{La}_{0.45}\text{Ca}_{0.55}\text{MnO}_3$ (LCMO), (b) LaFeO_3 (LFO), (c) LCMO-LFO annealed at 600°C , (d) LCMO-LFO annealed at 700°C , (e) LCMO-LFO annealed at 800°C and (f) LCMO-LFO annealed at 1000°C .

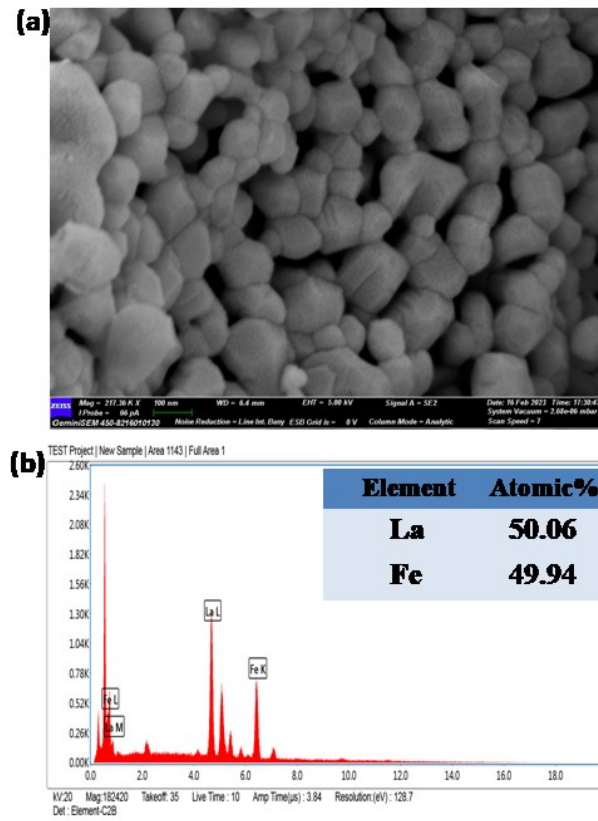


Fig. S2: (a) FE-SEM image of LaFeO₃ (LFO) and (b) EDX spectrum and cationic ratio.

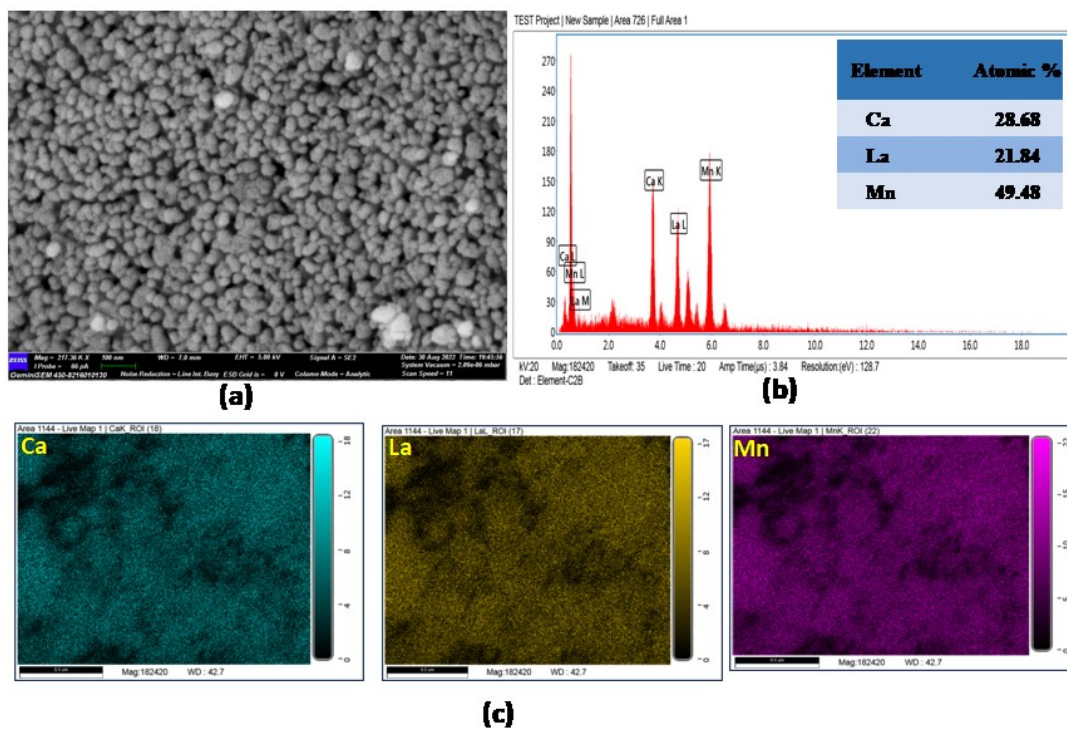


Fig. S3: (a) FE-SEM image of $\text{La}_{0.45}\text{Ca}_{0.55}\text{MnO}_3$ (LCMO), (b) EDX spectrum and cationic ratio, and (c) elemental mapping for the cations.

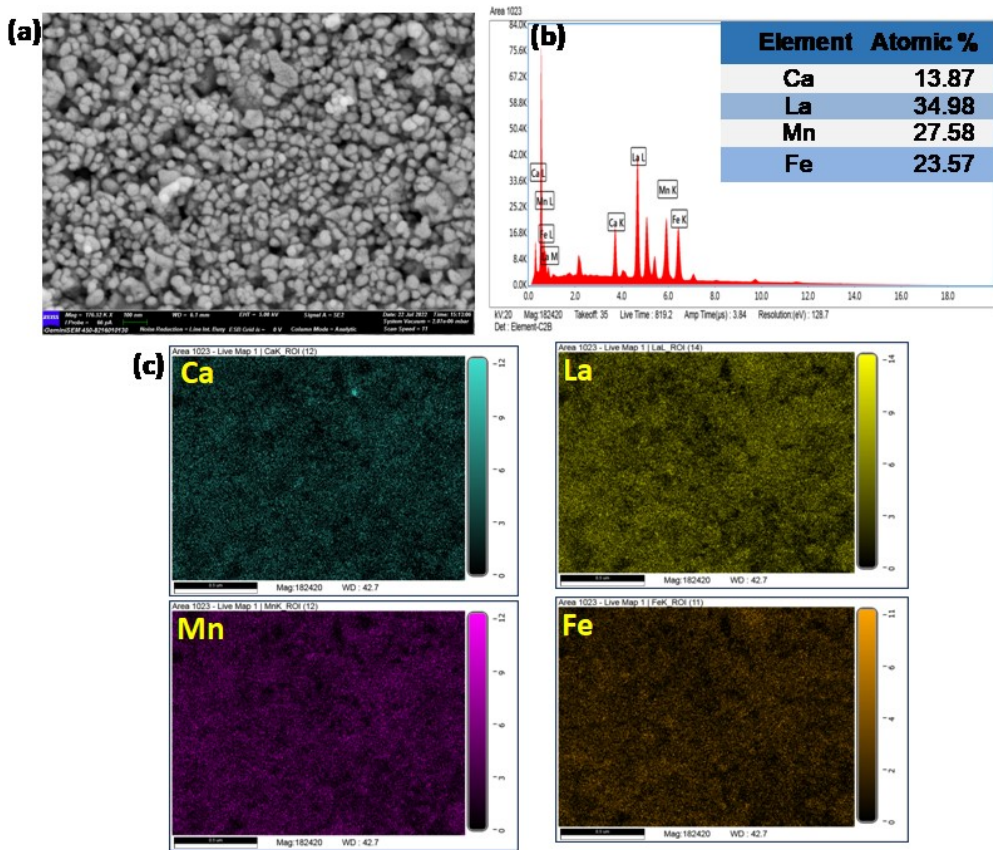


Fig. S4: (a) FE-SEM image of $\text{La}_{0.45}\text{Ca}_{0.55}\text{MnO}_3\text{-LaFeO}_3$ (LCMO-LFO) composite annealed at 600 °C, (b) EDX spectrum and cationic ratio, and (c) elemental mapping for the cations.

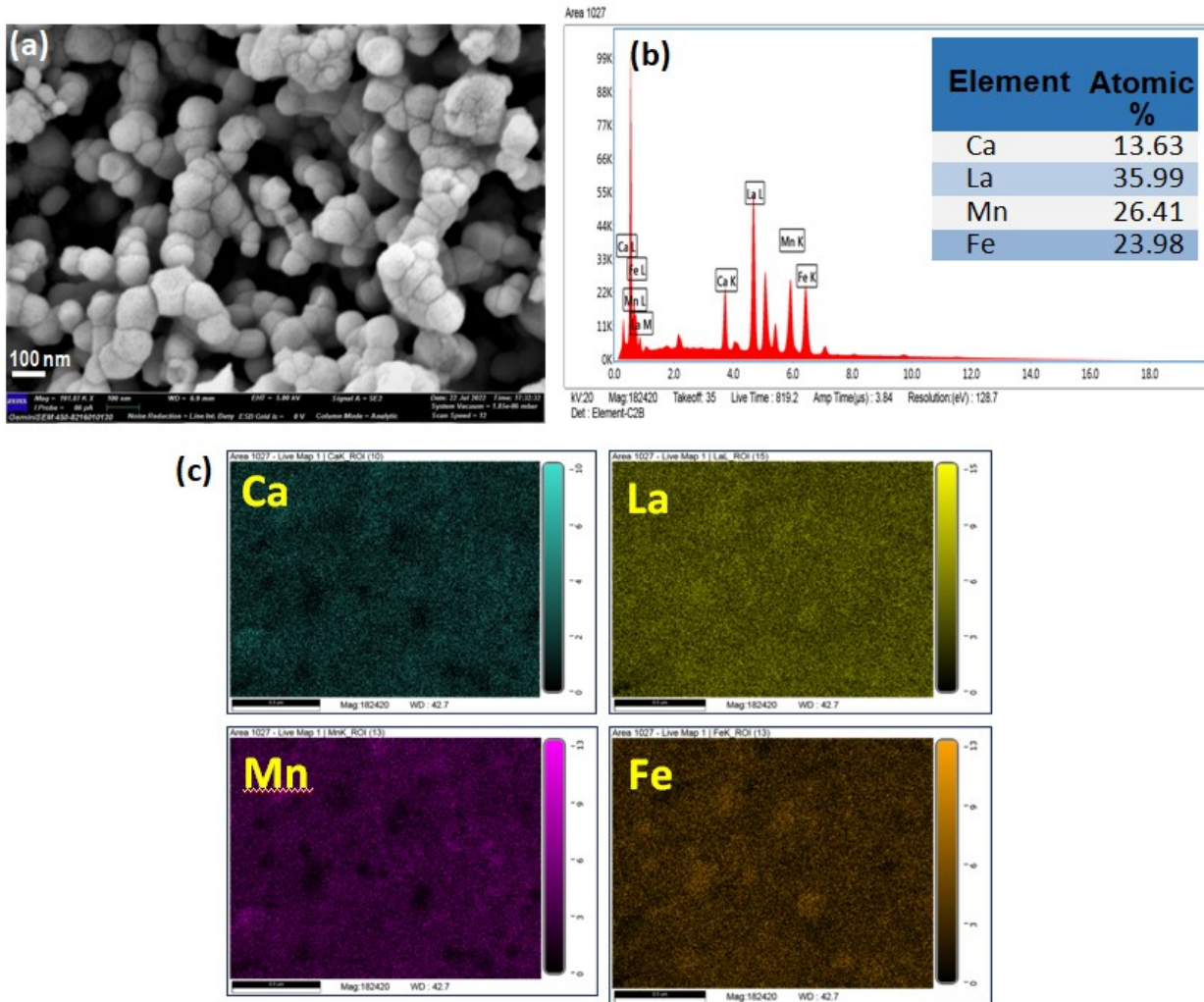


Fig. S5: (a) FE-SEM image of $\text{La}_{0.45}\text{Ca}_{0.55}\text{MnO}_3\text{-LaFeO}_3$ (LCMO-LFO) composite annealed at $700\text{ }^\circ\text{C}$, (b) EDX spectrum and cationic ratio, and (c) elemental mapping for the cations.

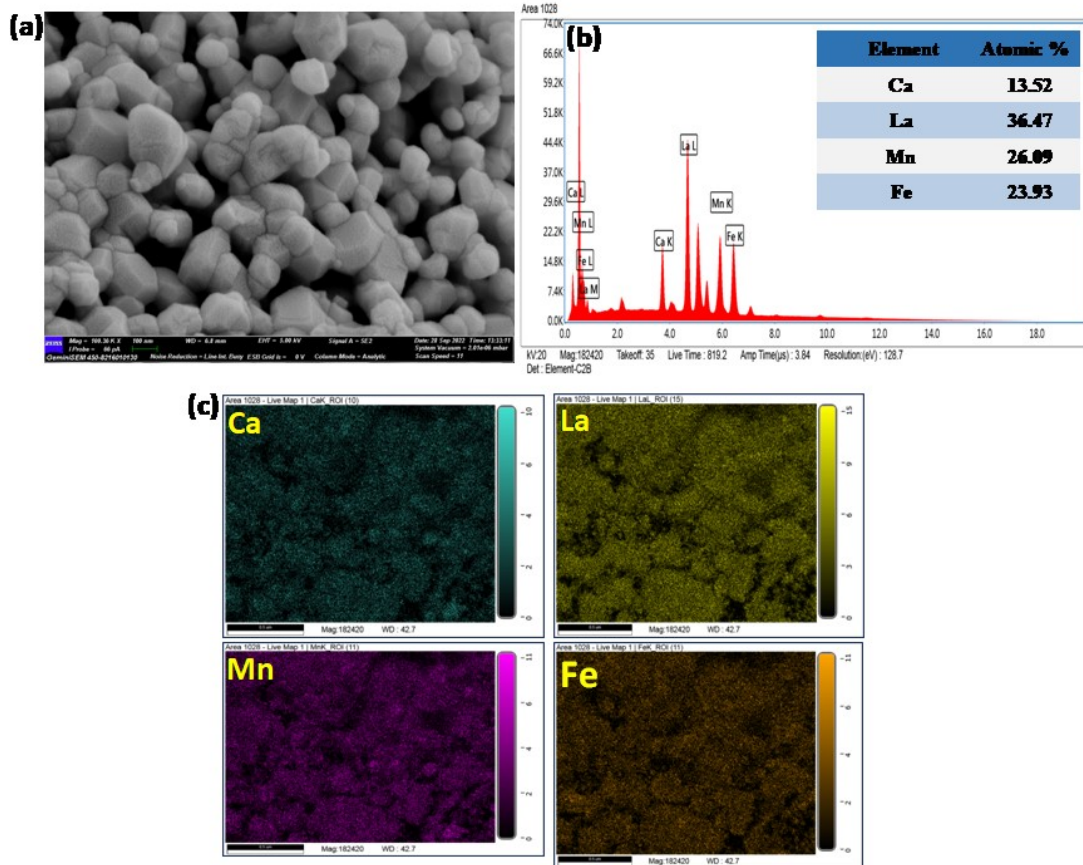


Fig. S6: (a) FE-SEM image of $\text{La}_{0.45}\text{Ca}_{0.55}\text{MnO}_3\text{-LaFeO}_3$ (LCMO-LFO) composite annealed at 800 °C, (b) EDX spectrum and cationic ratio, and (c) elemental mapping for the cations.

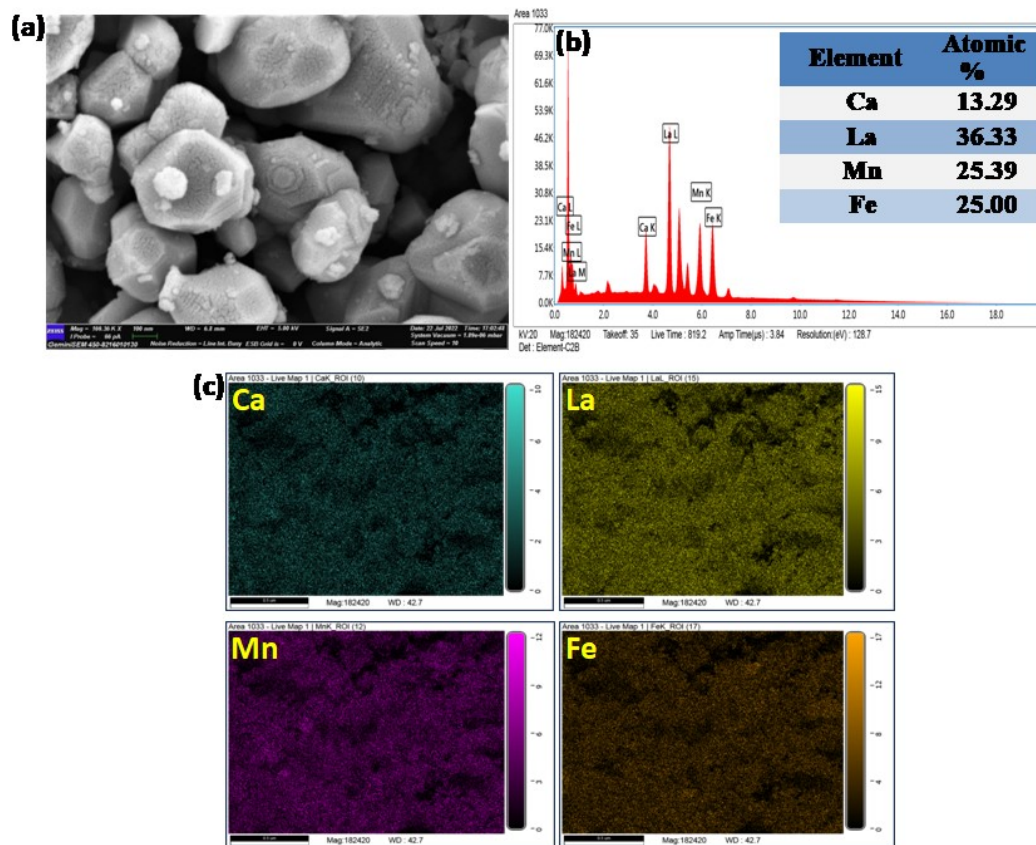


Fig. S7: (a) FE-SEM image of $\text{La}_{0.45}\text{Ca}_{0.55}\text{MnO}_3\text{-LaFeO}_3$ (LCMO-LFO) composite annealed at $1000\text{ }^\circ\text{C}$, (b) EDX spectrum and cationic ratio, and (c) elemental mapping for the cations.

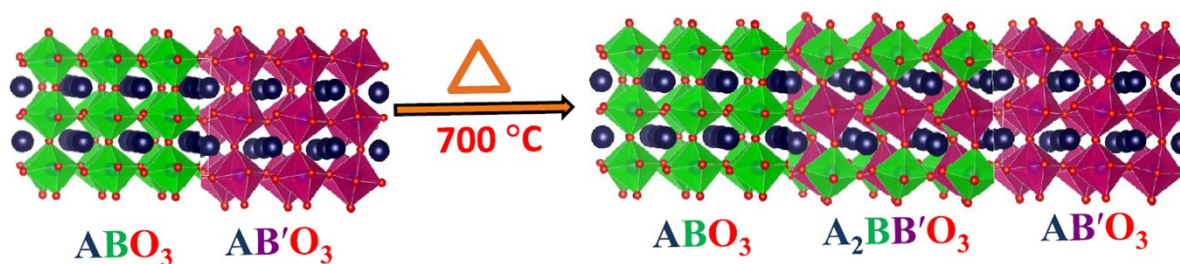


Fig. S8: Schematic view of cation ordering across the interface of grain boundary of two different perovskites via controlled thermal treatment.

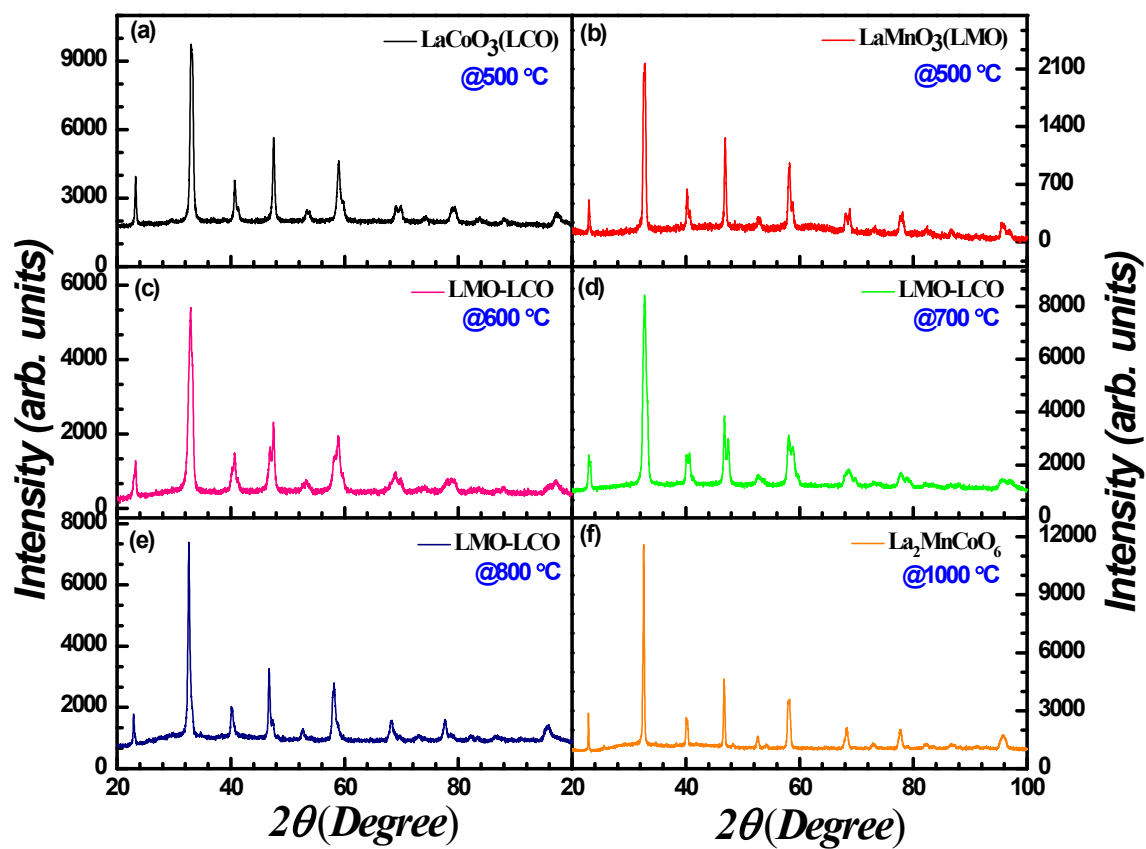


Fig. S9: Powder X-ray diffraction patterns of (a) LaCoO_3 (LCO), (b) LaMnO_3 (LMO) and LMO-LCO composite annealed at: (c) 600 °C, (d) 700 °C, (e) 800 °C and (f) 1000 °C.