Supplementary Material S1 Preparation of experimental reagents：

Weigh 8.660 g of $La(NO_3)_3 \cdot 6H_2O$ and dissolve it in 20 mL of deionized water with stirring. Following this, add $CaCl_2$ and CaO in a molar ratio of La : Ca = 0.6:0.4. Subsequently, add 5.325 mL of 98% pure $Mn(NO_3)_2 \cdot 4H_2O$, 80 mL of absolute ethanol, 20 mL of ethylene glycol, 19.2 g of citric acid, and 12 g of urea. Transfer the mixture to a polytetrafluoroethylene (PTFE) autoclave and heat at 180°C for 24 h, then allow it to cool naturally to room temperature. Collect the solid product, dry it in an oven at 80°C, and then grind it. Place the powder in a tube furnace with a heating rate of 5°C/min, and calcine it in air at 400°C for 2 h, followed by another calcination at 600°C for 4 h. Cool the material to room temperature and collect it, naming the materials LMO (CLMO and CaO-LMO).