Electronic Supplementary Material (ESI) for Materials Advances.

Electromechanical dopant-defect interaction in acceptor-doped ceria

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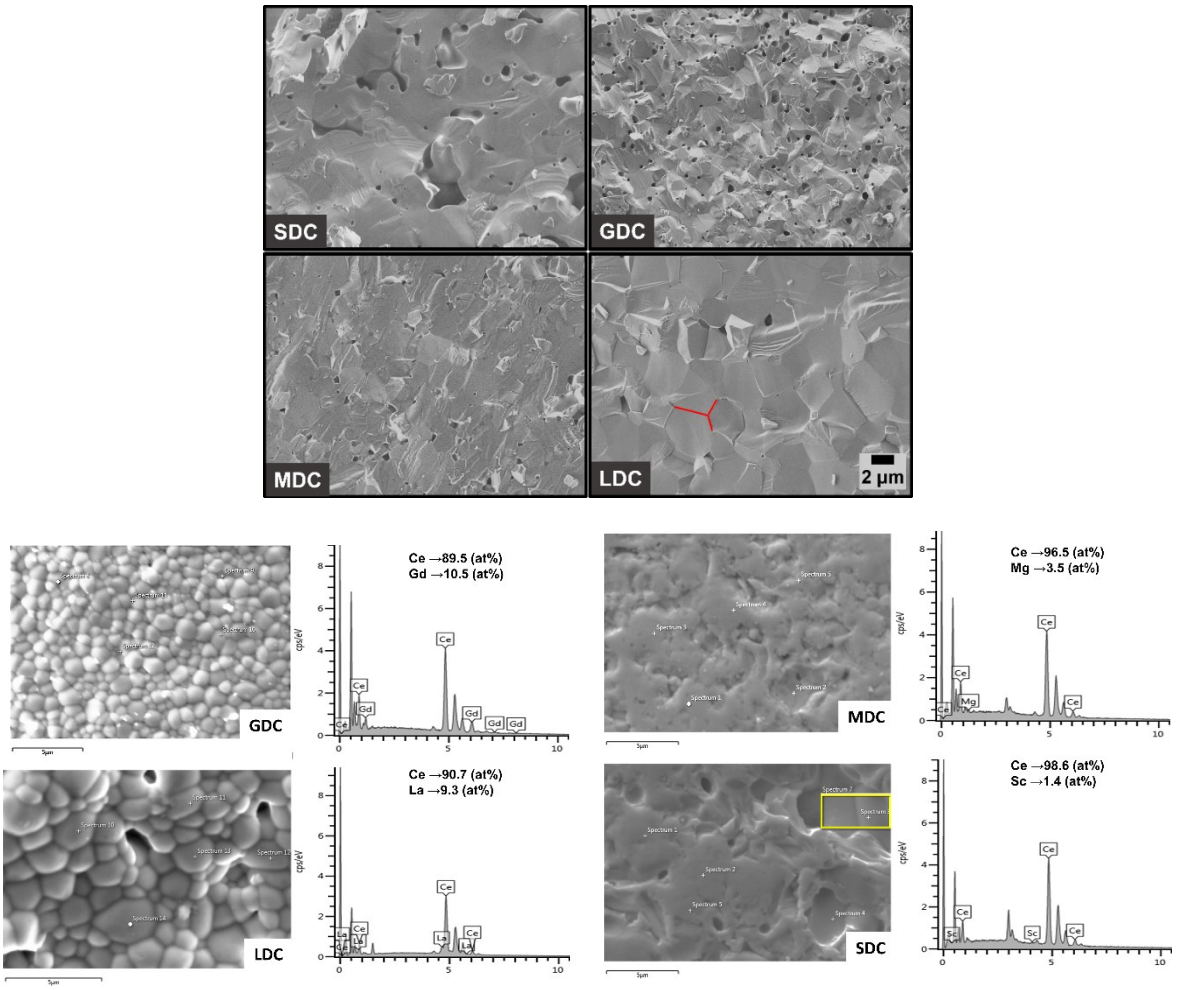

Figure S1: (Top): SEM images of the cold-fractured cross-sectional surface of variously doped ceria pellets, sintered at 1450 °C for 10 hours. These grains are thermodynamically more relaxed and have equilibrium shape at the triple point (red line). (Bottom): EDS analysis of the sintered pellets. The measurement was taken at around five different points at the grain interior and then averaged. As expected, we found low solubility in MDC and SDC samples. Voltage: 15 keV

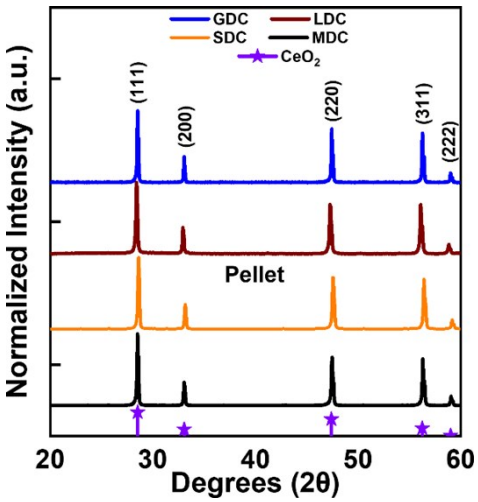

Figure S2: The X-ray diffraction (XRD) pattern of variously doped ceria pellet ($Ce_{1-x}M_xO_{2-\delta}$) where M = Sc^{3+}, Mg^{2+}, Gd^{3+} and La^{3+}. The results are compared with pure ceria (ICSD # 251473). All samples contain equivalent oxygen vacancy concentration, $V_{\ddot{O}}$ = 2.5 mol%.

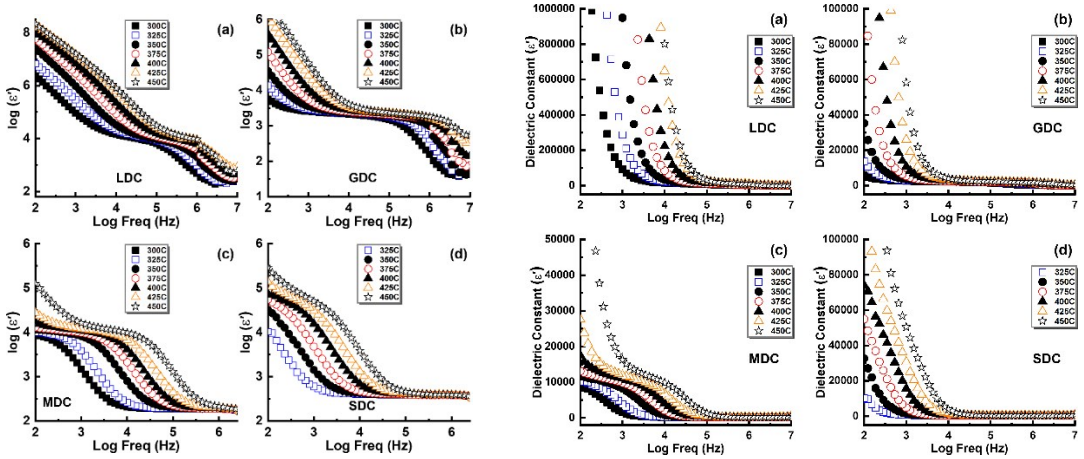

Figure S3: The frequency-dependent dielectric constant of the doped ceria samples at temperatures between 300-450 °C.

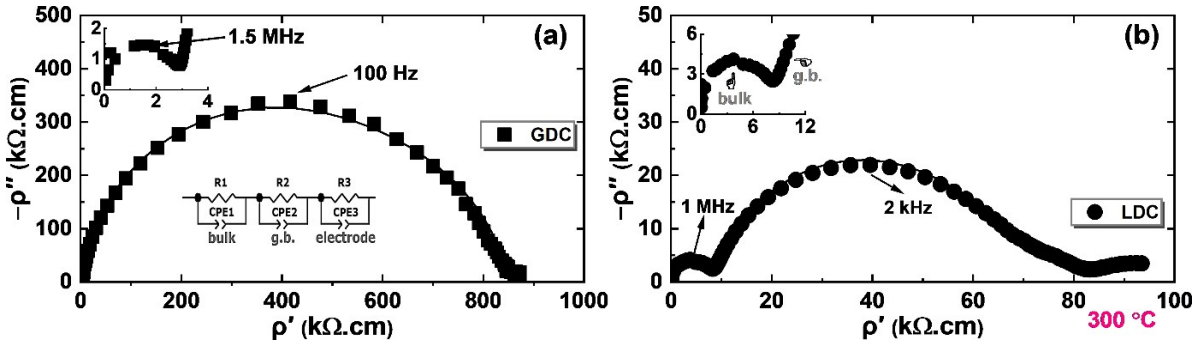

Figure S4: Representation of the geometry normalized Nyquist plot (ρ' vs ρ") of the (a) GDC and (b) LDC sample, examined at 300 °C in ambient air. Electrode material: Silver (Ag)

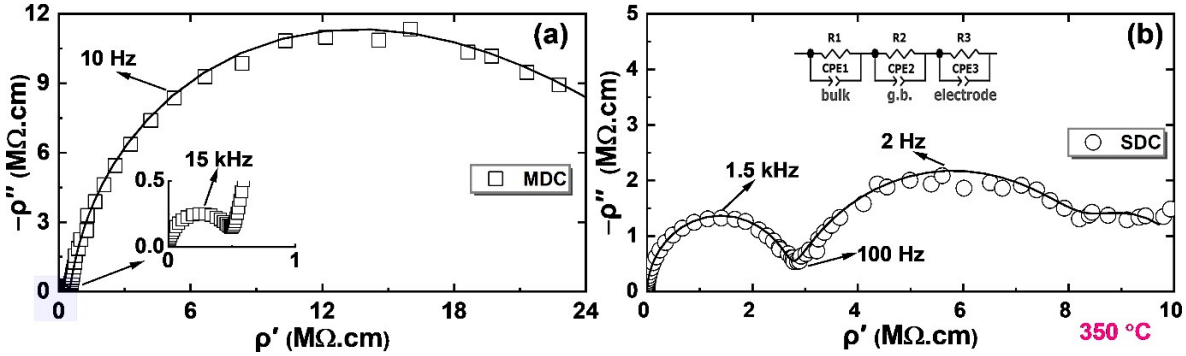

Figure S5: Representation of the geometry normalized Nyquist plot (ρ' vs ρ") of the (a) MDC and (b) SDC sample, examined at 350 °C in ambient air. Electrode material: Silver (Ag)

Table S1: Summary of the fitting parameters of Eqn 3.

Sample ID	(−) M_{33}^{0}, 10^{-17} (m/V)²	(−) M_{33}^{∞}, 10^{-17} (m/V)²	τ, S	α
LDC	0.5 ± 0.07	0.04 ± 0.001	0.9 ± 0.20	0.1 ± 0.15
GDC	6.4 ± 0.3	0.10 ± 0.01	1.85 ± 0.15	0.2 ± 0.08