

Supporting Information

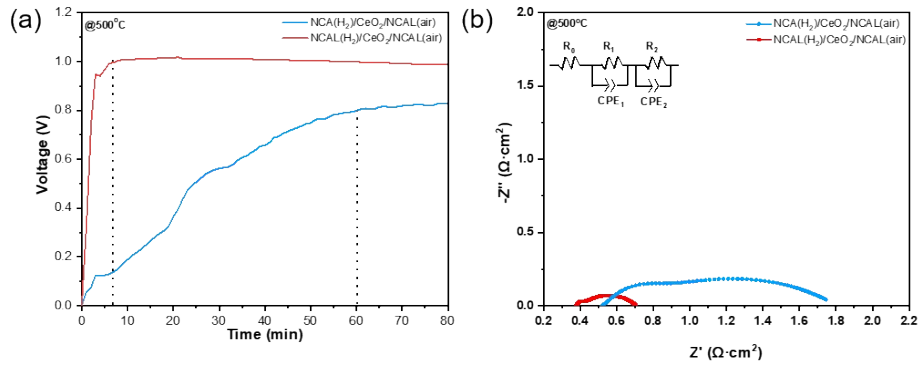
**Unveiling the role of lithium in cerium oxide based ceramic fuel cells  
employing lithium compounds as anode**

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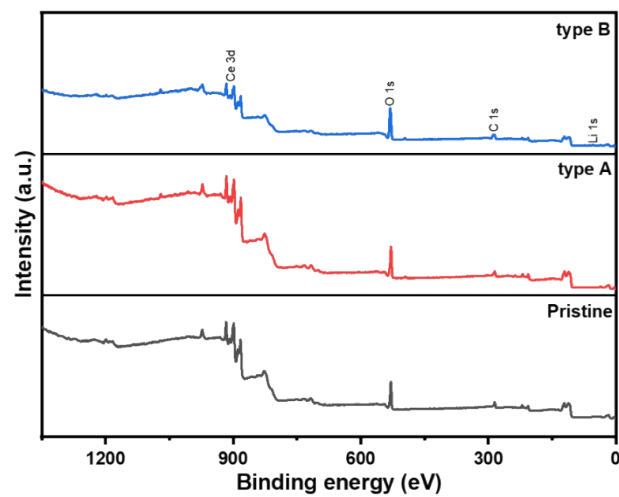
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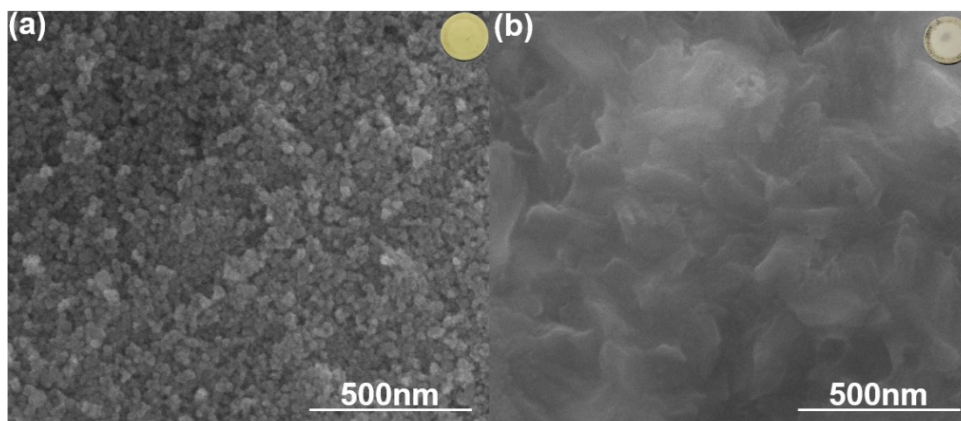
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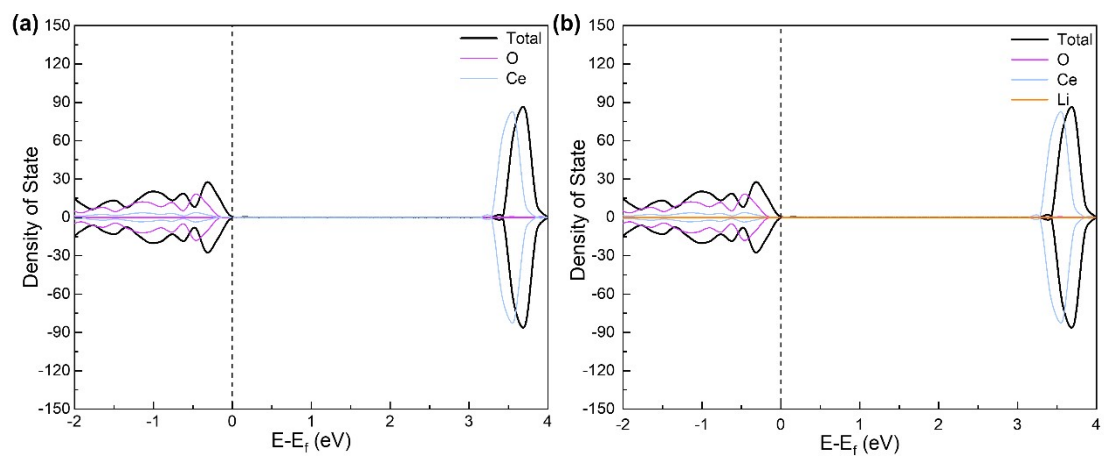
**Fig. S1** (a) extended stability under OCV state for NCAL/CeO<sub>2</sub>/NCAL and (b) the EIS result for fuel cells under OCV in H<sub>2</sub>/air atmosphere at 500 °C.



**Fig. S2** XPS survey results for pristine CeO<sub>2</sub> and type A \ type B cell after hydrogen treatment.



**Fig. S3** SEM images for type B cell (a) before and (b) after hydrogen treatment.



**Fig. S4** partial density of state for (a)  $\text{CeO}_2$  and (b)  $\text{Li}_{0.0625}\text{Ce}_{0.9375}\text{O}_2$ .

**Table S1** EIS fitting results for NCA or NCAL as anode at 500 °C, R has the unit of  $\Omega \text{ cm}^2$ .

	R0	R1	CPE1-T	CPE1-P	R2	CPE2-T	CPE2-P	RP
NCAL/CeO <sub>2</sub> /NCAL	0.378	0.023	0.016	1.212	0.308	1.372	0.540	0.331
NCA/CeO <sub>2</sub> /NCAL	0.518	0.183	0.025	0.846	1.107	0.509	0.404	1.290

**Table S2** peak fitting detail resulting for Ce 3d of type A and type B cell before and after treatment.

pristine		Type A		Type B	
peak position(eV)	area	peak position(eV)	area	peak position(eV)	area
882.161	78998.64	881.748	88059.769	882.46	82090.401
884.67	31701.06	884.718	35840.988	885.045	48813.004
888.593	54420.46	888.301	46790.619	889.03	48922.397
897.986	90301.59	897.576	86052.122	898.435	88641.184
900.681	61323.52	900.294	59221.475	901.003	44484.65
902.845	12128.27	902.67	19331.629	902.688	29875.198
907.2	54069.9	906.776	50292.857	907.515	52670.763
916.322	79328.4	915.912	76692.586	916.719	66761.531