

Electronic Supplementary Information (ESI) for:

**Optimization of misfit calcium cobaltite oxygen
electrodes for solid oxide fuel cells through
electrospinning processing**

Allan J. M. Araújo,^{*a,b} Itzhak I. Maor,^c Laura I. V. Holz,^{a,b} Meirav Mann-Lahav,^c

Vadim Beilin,^c Armin Feldhoff,^d Gideon S. Grader,^{**c,e} Francisco J. A. Loureiro^{***a,b}

^a TEMA - Centre for Mechanical Technology and Automation, Department of Mechanical Engineering, University of Aveiro, 3810-193 Aveiro, Portugal.

^b LASI - Intelligent Systems Associate Laboratory, 4800-058, Guimarães, Portugal.

^c Wolfson Department of Chemical Engineering, Technion – Israel Institute of Technology, 3200003 Haifa, Israel.

^d Institute of Physical Chemistry and Electrochemistry, Leibniz University Hannover, 30167 Hannover, Germany.

^e The Nancy & Stephan Grand Technion Energy Program (GTEP), Technion – Israel Institute of Technology, 3200003 Haifa, Israel.

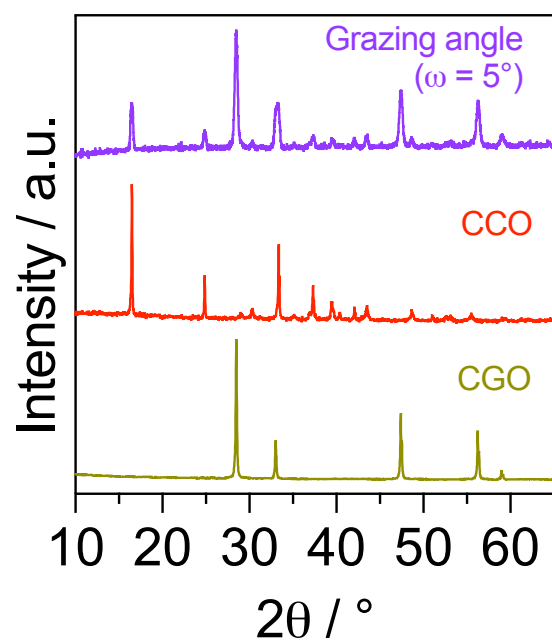


Fig. S1 – Grazing angle X-ray diffraction patterns obtained for ES-CCO_SP-5D symmetrical cell electrodes.

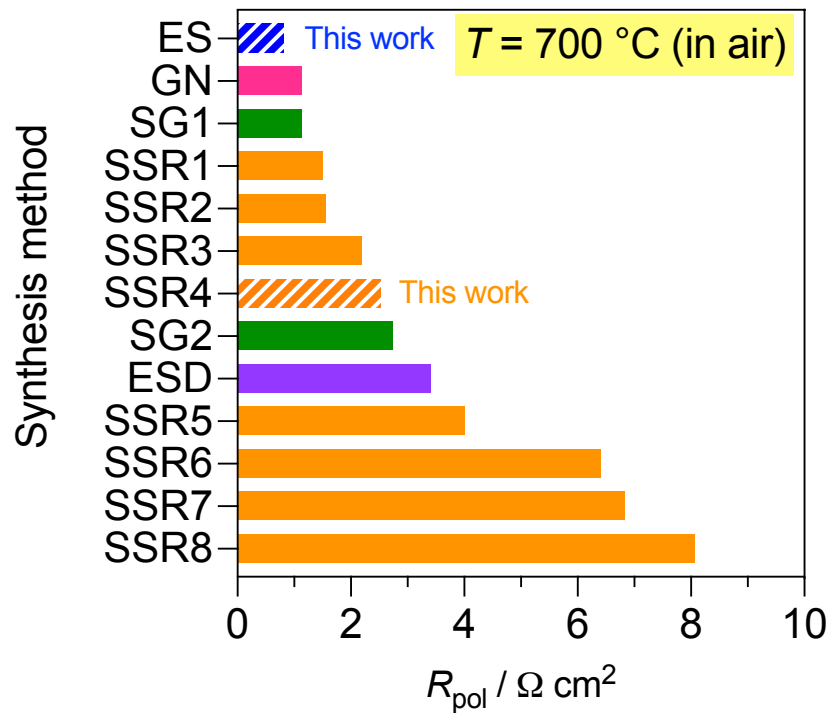


Fig. S2 – Literature survey on CCO electrodes for SOFC applications. Captions: **ES** – (electrospinning, ES-CCO_SP-5D); **GN** – (Glycerol nitrate combustion, <https://doi.org/10.1016/j.ceramint.2023.03.281>); **SG1** – (Sol-gel, <https://doi.org/10.1016/j.jallcom.2016.09.297>); **SSR1** – (Solid-state reaction, <https://doi.org/10.1016/j.jpowsour.2011.08.110>); **SSR2** – (Solid-state reaction, <https://doi.org/10.1016/j.jpowsour.2015.01.150>); **SSR3** – (Solid-state reaction, <https://doi.org/10.1016/j.ijhydene.2017.12.040>); **SSR4** – (Solid-state reaction, ES-CCO_SP-5D electrode); **SG2** – (Sol-gel, <https://doi.org/10.1016/j.electacta.2018.08.018>); **ESD** – (Electrostatic spray deposition, <https://doi.org/10.1016/j.electacta.2020.137142>); **SSR5** – (Solid-state reaction, <https://doi.org/10.1021/cm902040v>); **SSR6** – (Solid-state reaction, <https://doi.org/10.1016/j.jpowsour.2011.02.030>); **SSR7** – (Solid-state reaction, <https://doi.org/10.1016/j.ceramint.2017.04.099>); **SSR8** – (Solid-state reaction, <https://doi.org/10.1016/j.jallcom.2019.02.209>).

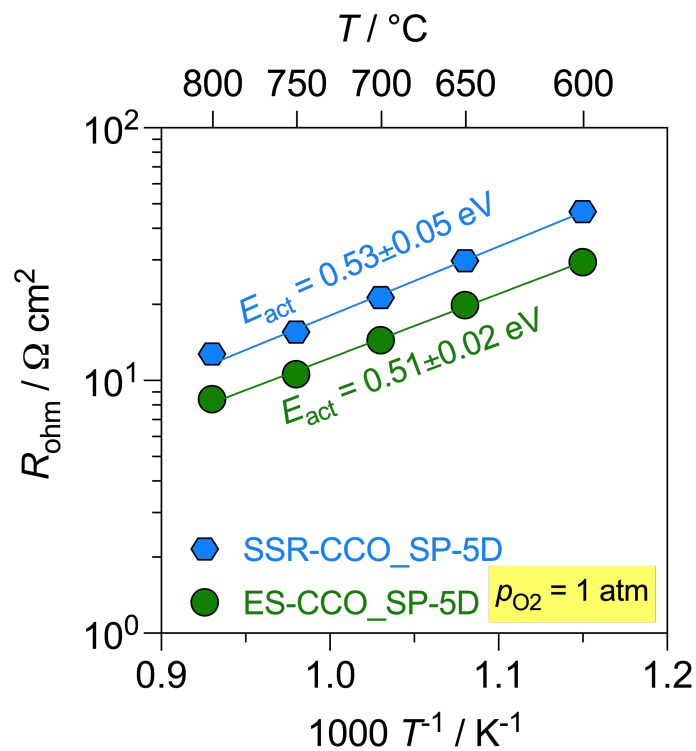


Fig. S3 – Ohmic (R_{ohm}) polarization resistance as a function of the reciprocal temperature for the SSR-CCO_SP-5D and the ES-CCO_SP-5D electrodes in oxygen ($p_{O_2} = 1 \text{ atm}$).

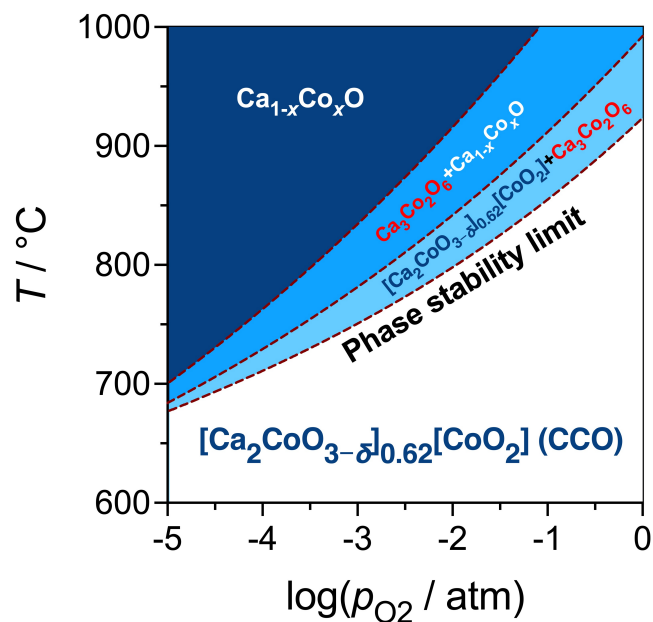


Fig. S4 – Phase stability diagram of the misfit $[Ca_2CoO_{3-\delta}]_q[CoO_2]$ compound. Calculations performed on thermodynamic data extended from <https://doi.org/10.1016/j.jssc.2012.05.014>.