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Thermal Engineering of SrCoO<sub>3</sub> Perovskite Oxide for Enhanced Bifunctional Electrocatalysis toward HER and OER

Rohit Kumara, Itika Kainthlaa\*, Sumanth Dongreb, Samriti Mehtaa, Rajni Thakura, Sahil Kumara

<sup>a</sup> School of Physics and Materials Science, Shoolini University, Solan, India 173229

<sup>b</sup> Centre for Nano and Material Sciences, Jain (Deemed-to-be University), Jain Global Campus, Kanakapura, Bangalore, Karnataka 562112, India

#### **INTRODUCTION & AIM** Excellent Energy Carrier (142MJ/kg) Intensity (a.u.) refueling time than commercial Sources 20 10 fuels Economically Competitive (a) PROPERTIES OF HYDROGEN SUSTAINABLE DEVELOPMENT GOALS **BATTERY** (a) **CATHODE ANODE** -20 B j (mA cm<sup>-2</sup>) -60 -80 CATION -100 -120 **ELECTROLYTE** -0.7 -0.6 -0.5 -0.8 FIGURE: SCHEMATIC ILLUSTRATION FIGURE: PEROVSKITE OXIDE (a)<sup>80</sup> **OF WATER ELECTROLYSIS STRUCTURE** SCO800 SCO900 SCO1000 Synthesis and Optimization of SrCoO<sub>3</sub> as an electrocatalyst for water 60 **Aim** splitting т Э Э Э Э Э SCO900 **METHOD** SCO1000 Cobalt Nitrate Cittic Strontium Ammonia Nitrate solution Stir for 1h

Rise temp. up to 80°C

Calcination in muffle

furnace (2h)

# SCHEMATIC ILLUSTRATION OF SYNTHESIS OF $SrCoO_3$ BY SOL-GEL METHOD.

Raw material

precursors+ citric acid

SrCoO<sub>3</sub>

Stir for 30 minutes

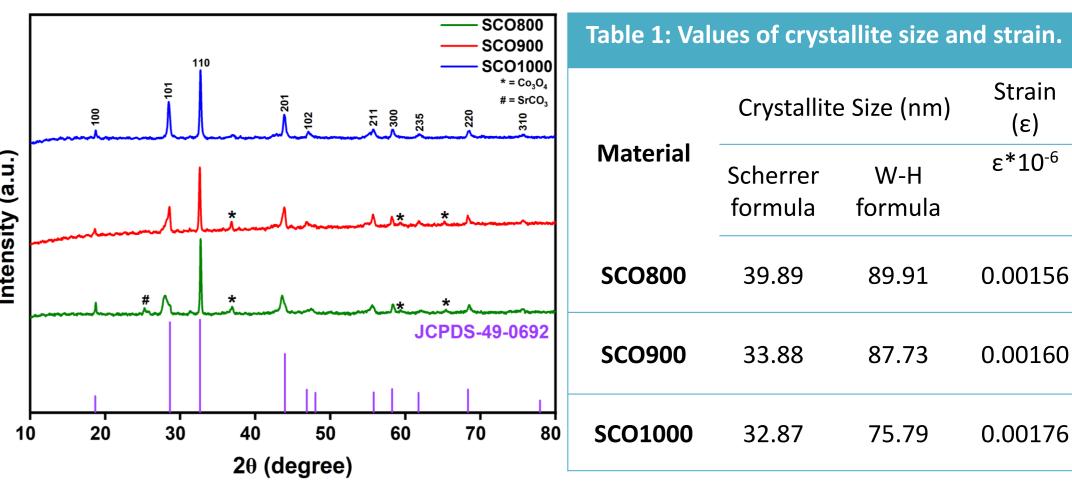
Grind

Add ammonia solution

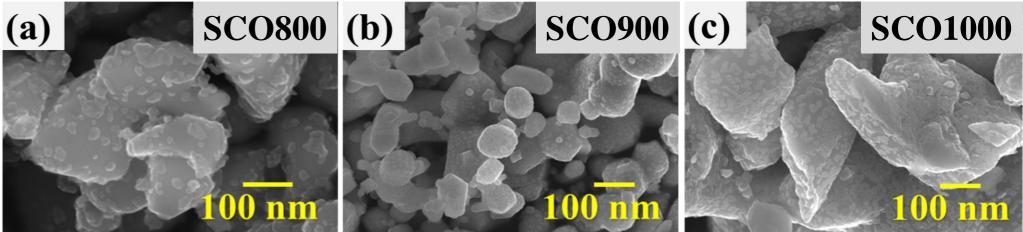
till pH 7

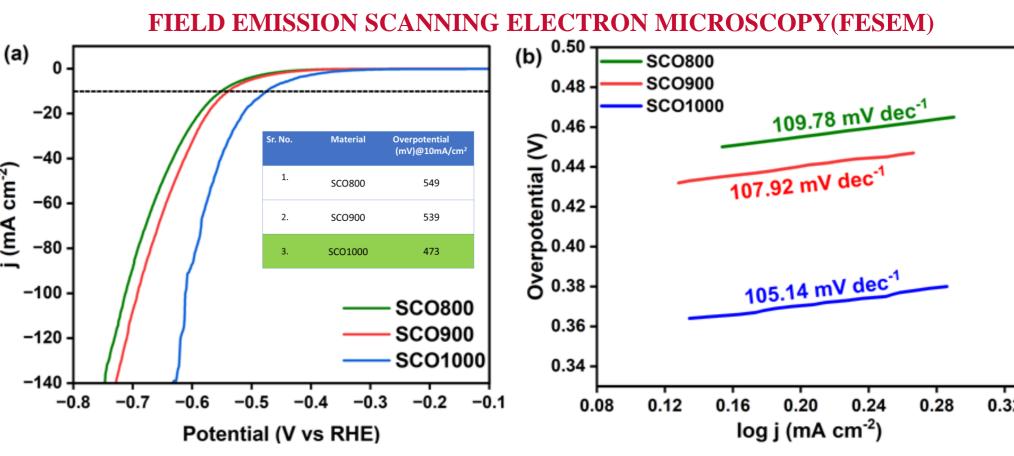
Dry sample

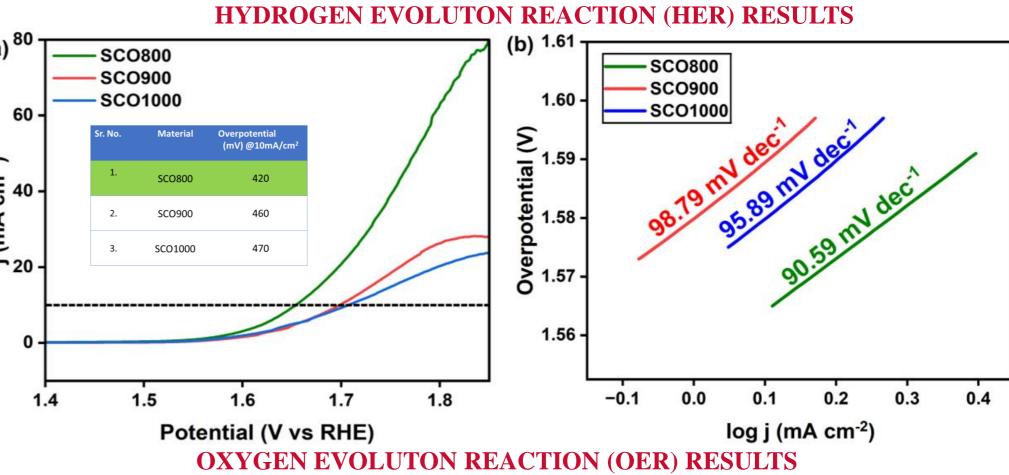
#### **RESULTS & DISCUSSION**



#### X-RAY DIFFRACTION (XRD)







## CONCLUSION

- SrCoO<sub>3</sub> electrocatalysts were synthesized at 800 °C, 900 °C, and 1000 °C and evaluated for HER & OER.
- For HER, SCO1000 showed the better performance with an overpotential of 473 mV @ 10 mA cm<sup>-2</sup> and showed Tafel slope of 105.14 mV dec<sup>-1</sup>.
- For OER, SCO800 showed the better performance with an overpotential of 420 mV @ 10 mA cm<sup>-2</sup> and showed Tafel slope of 90.59 mV dec<sup>-1</sup>.

### FUTURE WORK / REFERENCES

**FUTURE WORK:** Advanced studies using XPS and HRTEM will be conducted to gain deeper insights into surface chemistry and lattice structure.

**REFERENCES:** Kumar, R., et al., Progress in Perovskite Oxide Electrocatalysts for Efficient Hydrogen and Oxygen Evolution Reactions. 2025: p. 1-30.

Kumar, R., et al., Quaternary Transition Metal Dichalcogenides (M1-xNxX2 (1-y) Y2y) for Hydrogen Evolution: A Review on Atomic Structure, 3D Engineering, and Electrocatalytic Performance. 2025: p. 100532.