



Structural, Electrocatalytic, Dielectric and Optical studies to unveil the synergistic effect of B-site cations diversity in

$\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{1-x}\text{B}_x\text{O}_3$ ($0 \leq x \leq 0.8$) (B= Ni, Fe, Cu, Cr) Oxide Materials

Uzma Hira

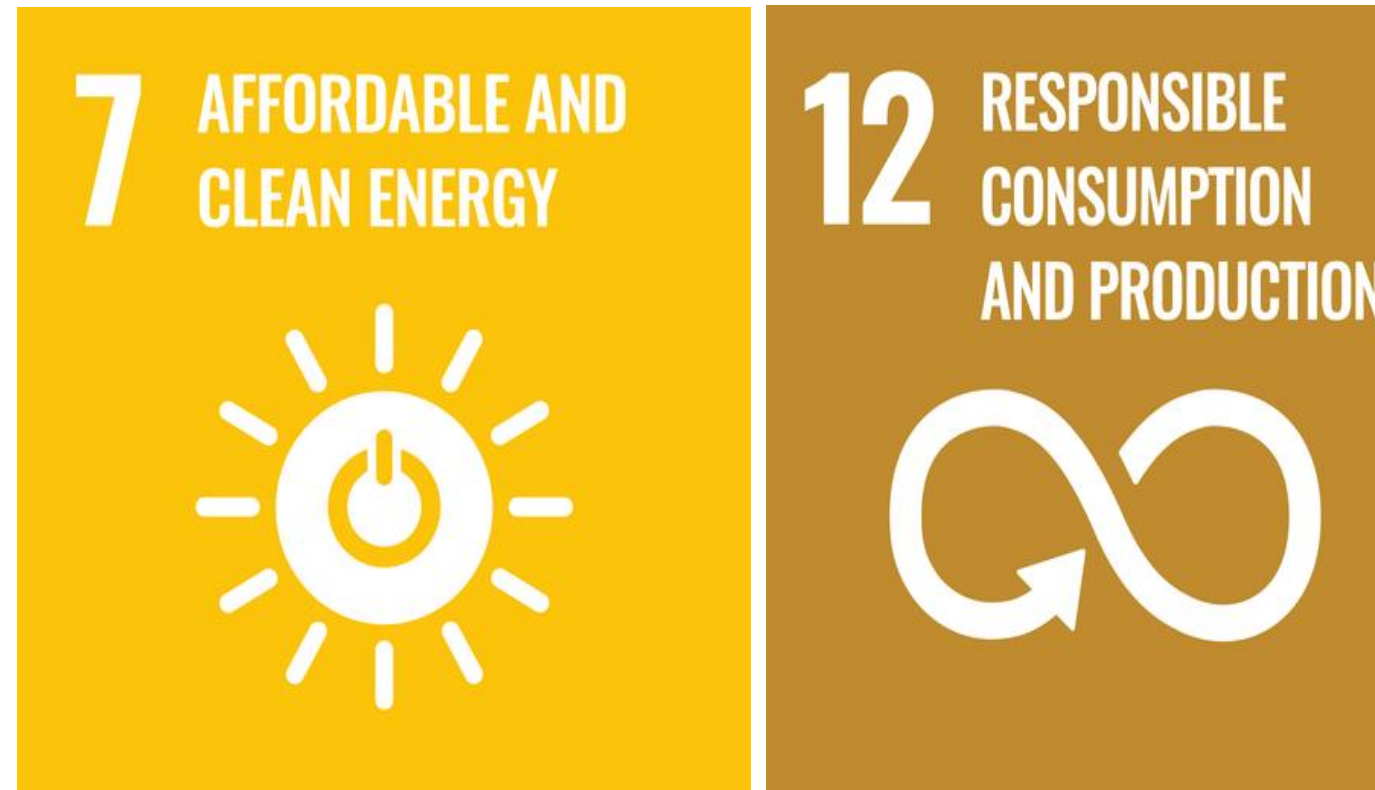
School of Chemistry, University of the Punjab, Lahore, Pakistan

Why this material?

Problem: Slow water splitting reaction/ Oxygen Evolution

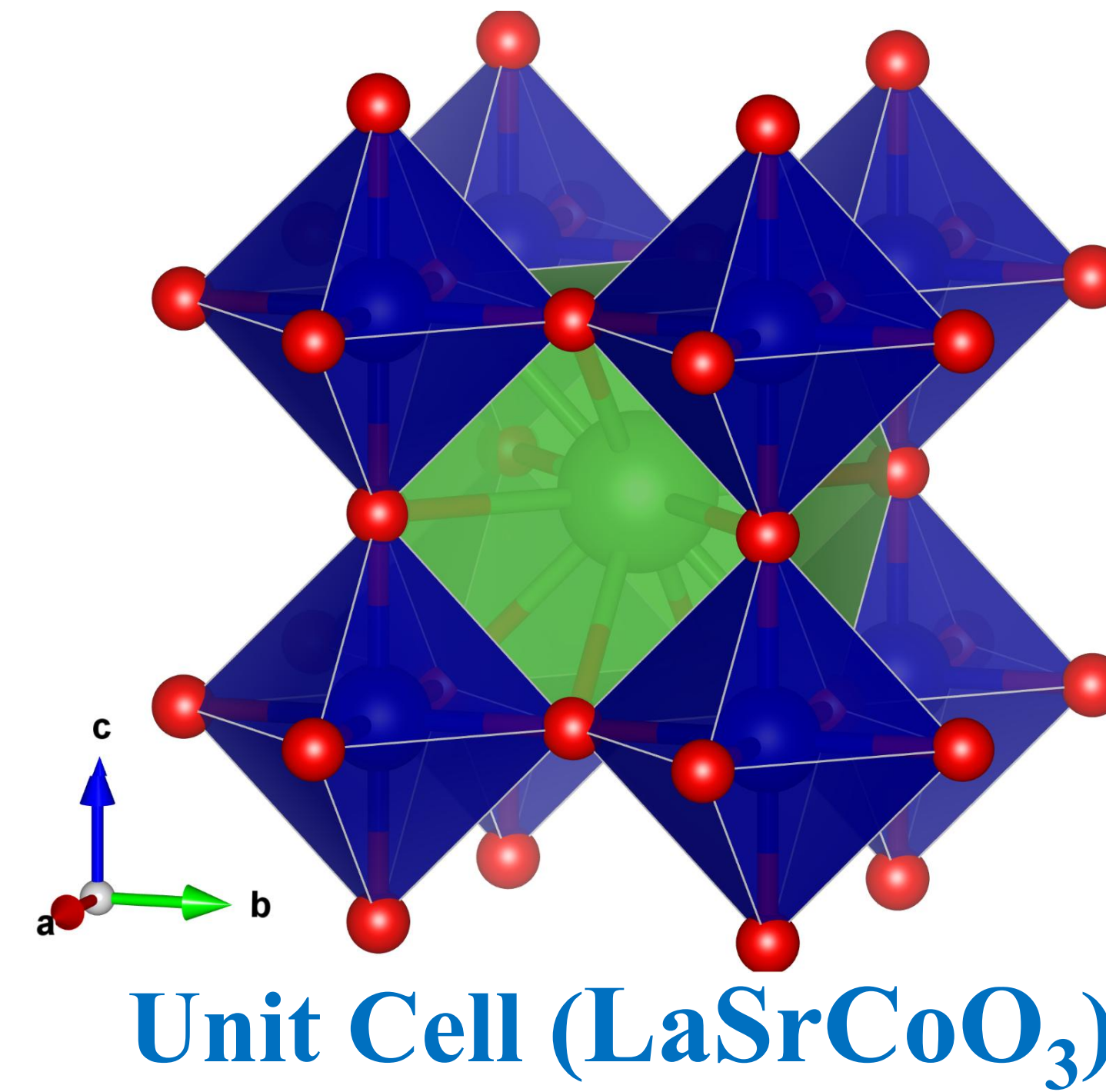
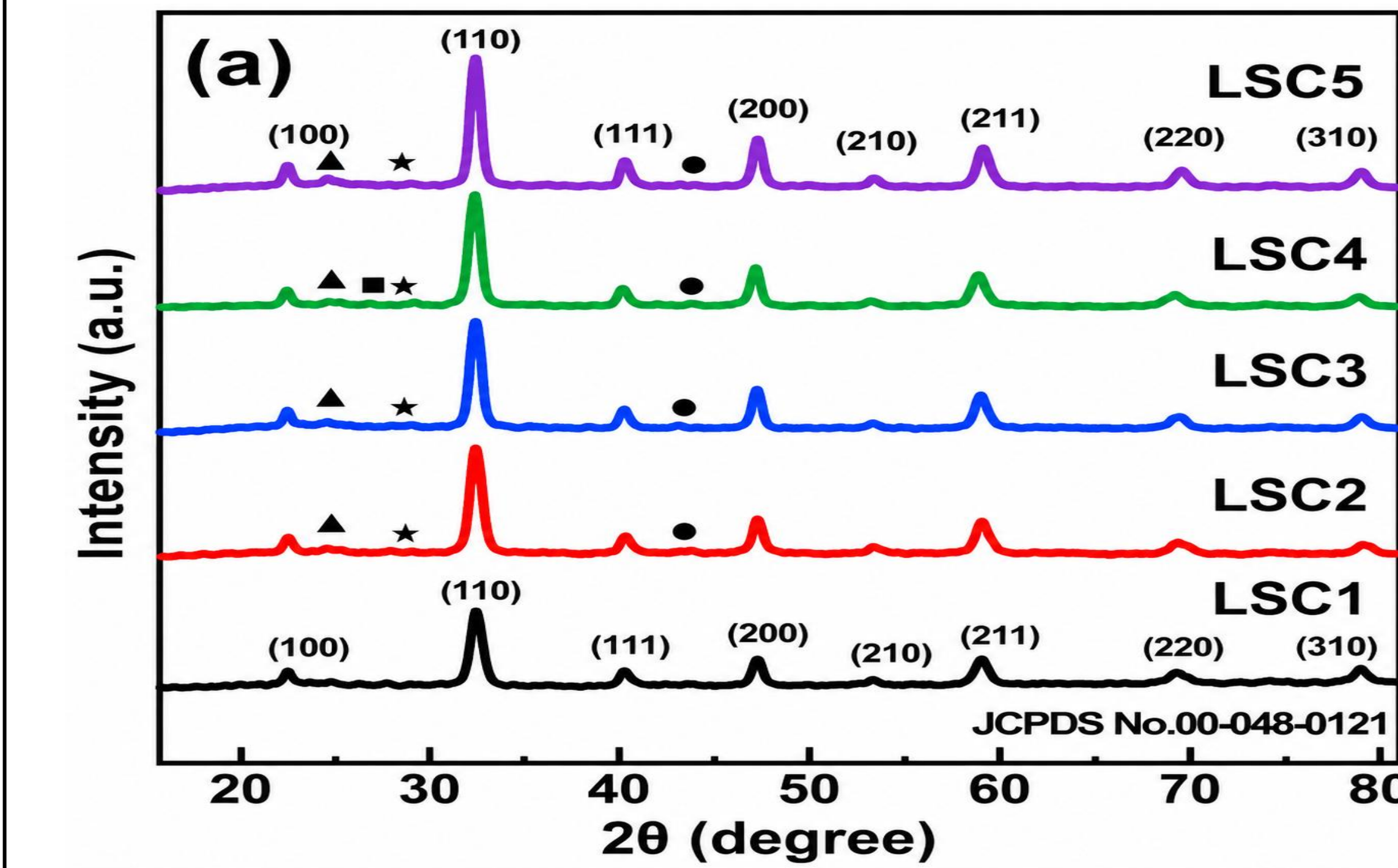
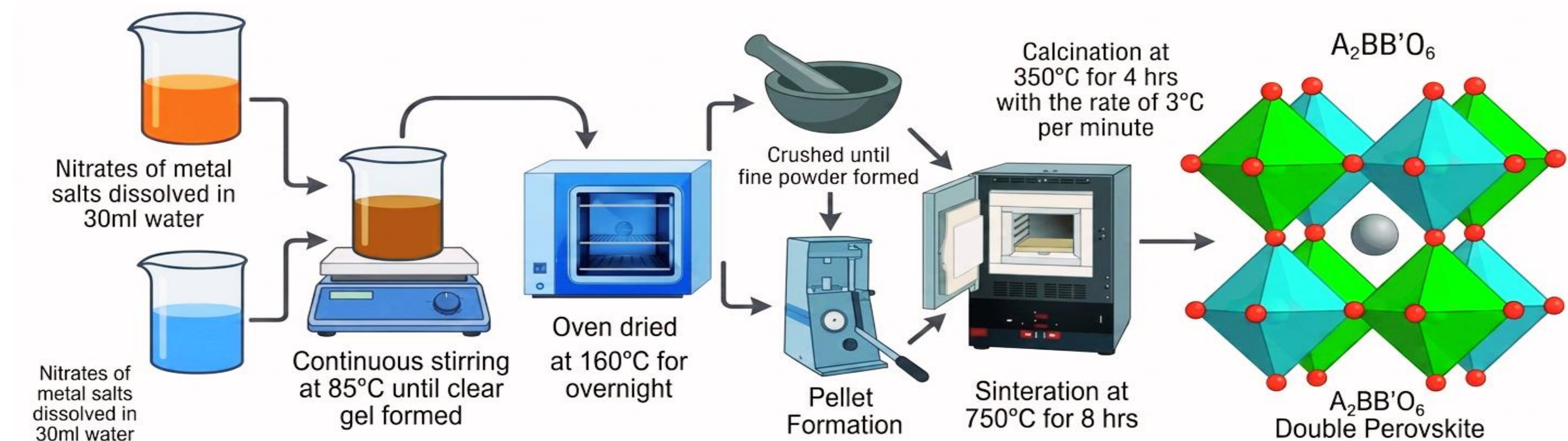
Reaction.

Aim: Study B-site effects on
multifunctional perovskite oxide
properties.



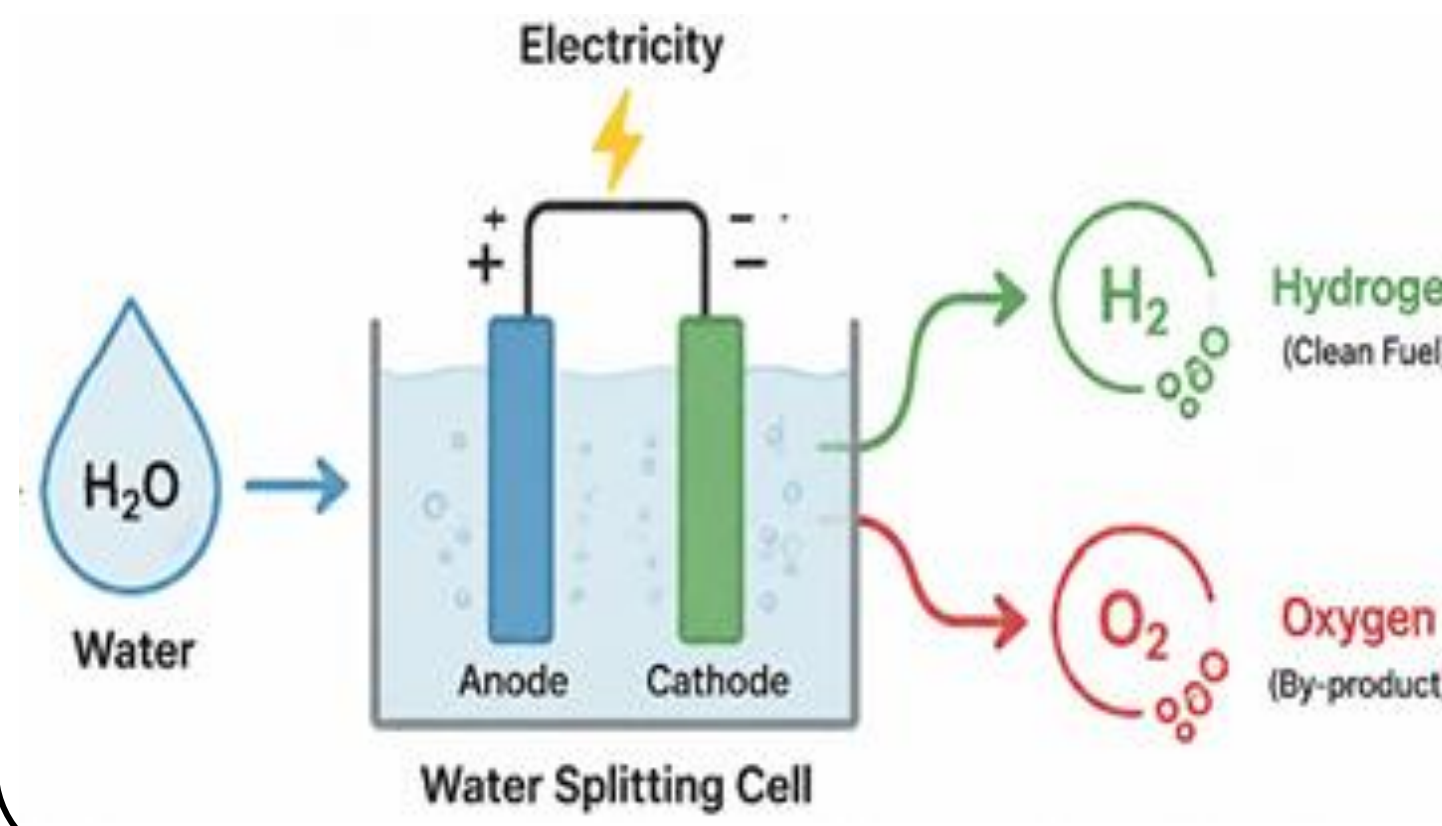
Sample Code	Composition	B-site Cation(s) (x)	x (Total B-site substitution)
LSC1	$\text{La}_{0.6}\text{Sr}_{0.4}\text{CoO}_3$	Co (1.0)	x = 0
LSC2	$\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.8}\text{Ni}_{0.2}\text{O}_3$	Co Ni (0.2)	x = 0.2
LSC3	$\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.6}\text{Ni}_{0.2}\text{Fe}_{0.2}\text{O}_3$	Co Ni Fe (0.4)	x = 0.4
LSC4	$\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.4}\text{Ni}_{0.2}\text{Fe}_{0.2}\text{Cu}_{0.2}\text{O}_3$	Co Ni Fe Cu (0.6)	x = 0.6
LSC5	$\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.2}\text{Ni}_{0.2}\text{Fe}_{0.2}\text{Cu}_{0.2}\text{Cr}_{0.2}\text{O}_3$	Co Ni Fe Cu Cr (0.8)	x = 0.8

SYNTHESIS: PECHINI SOL-GEL FLOW

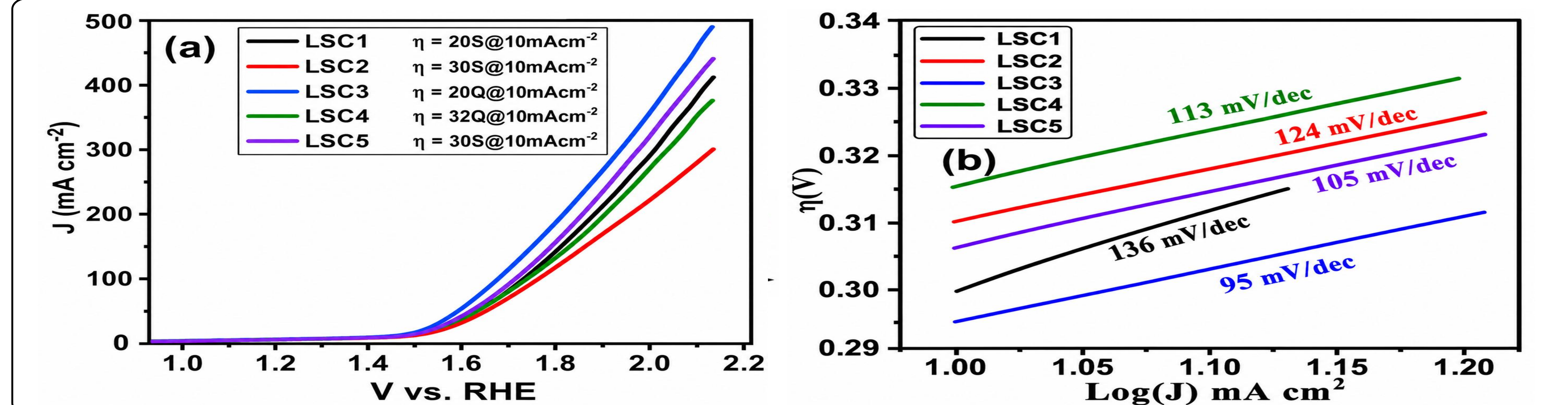


Water Splitting for Clean Energy:

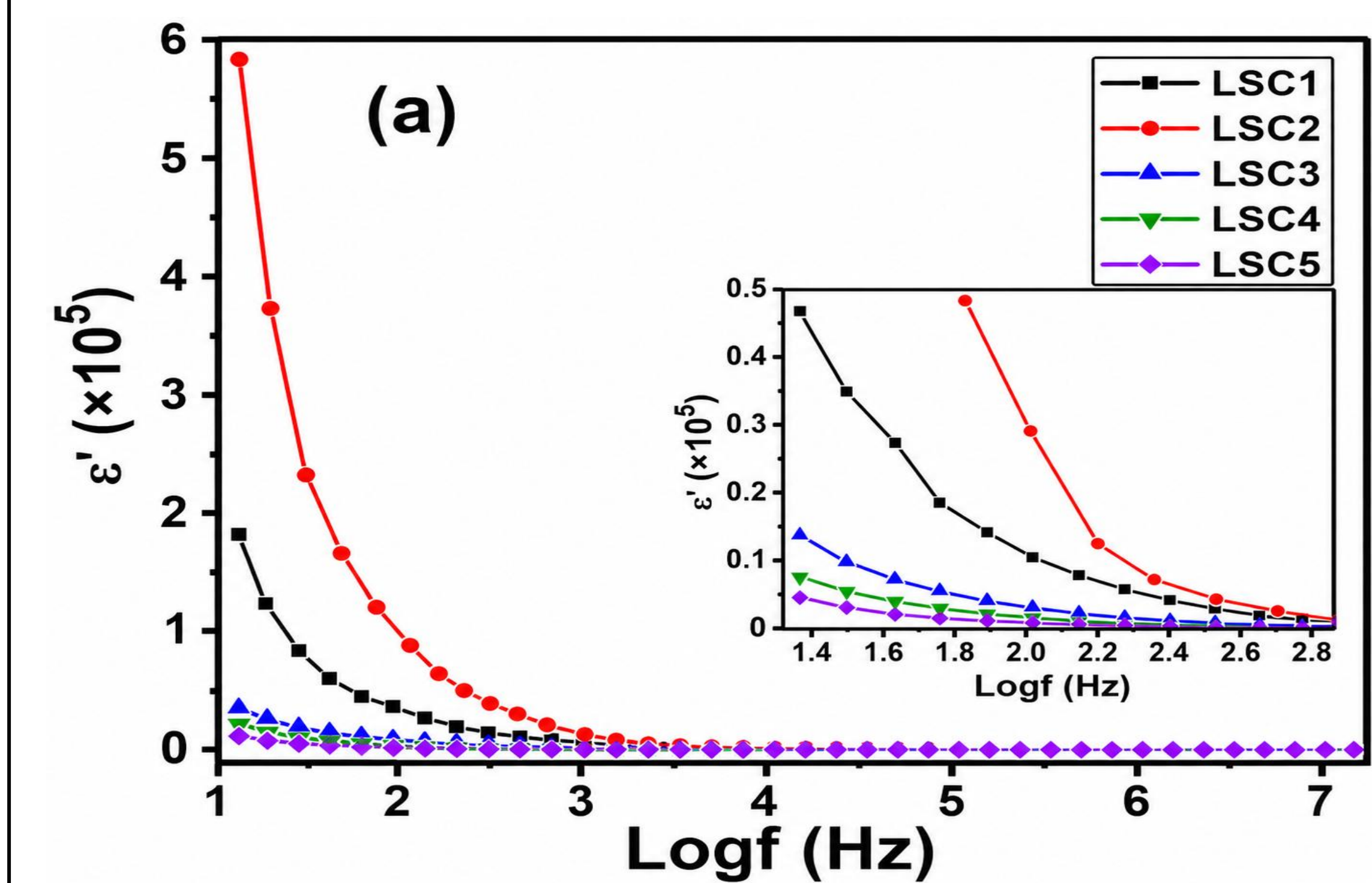
Water splitting:



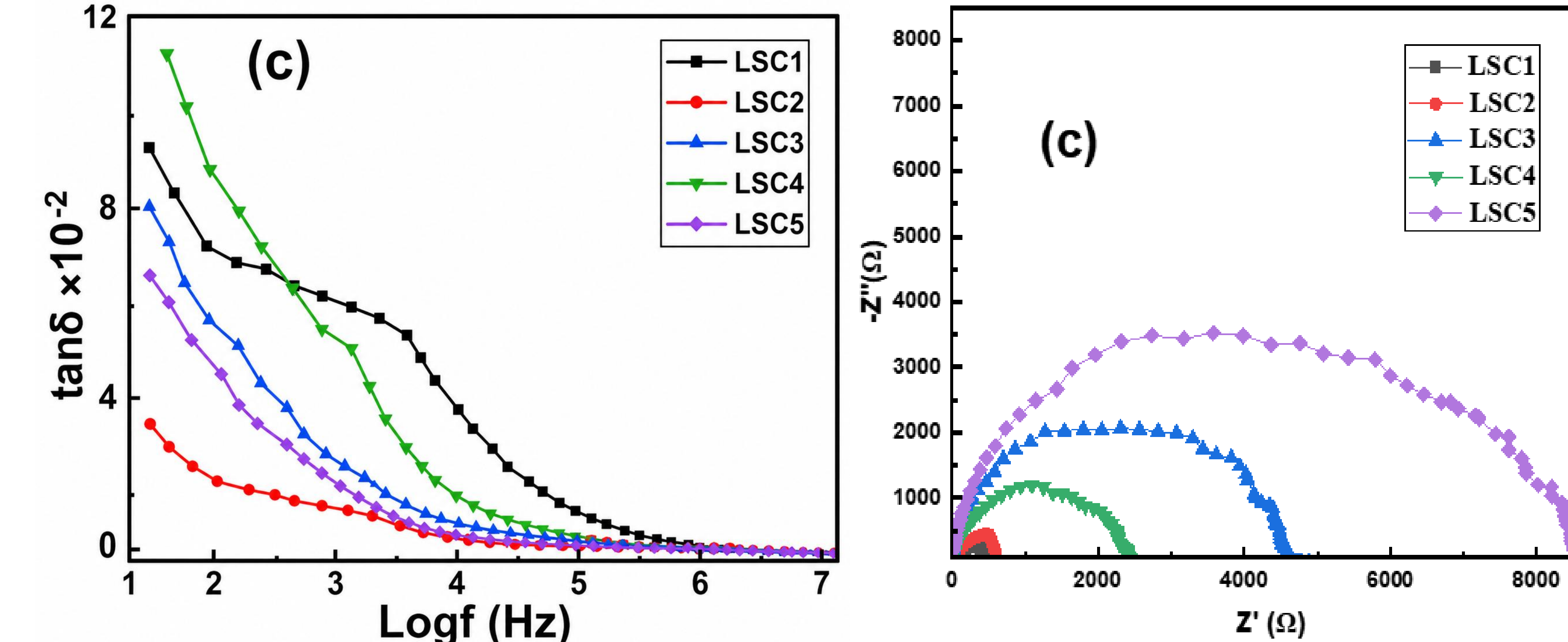
OXYGEN EVOLUTION REACTION RESULTS



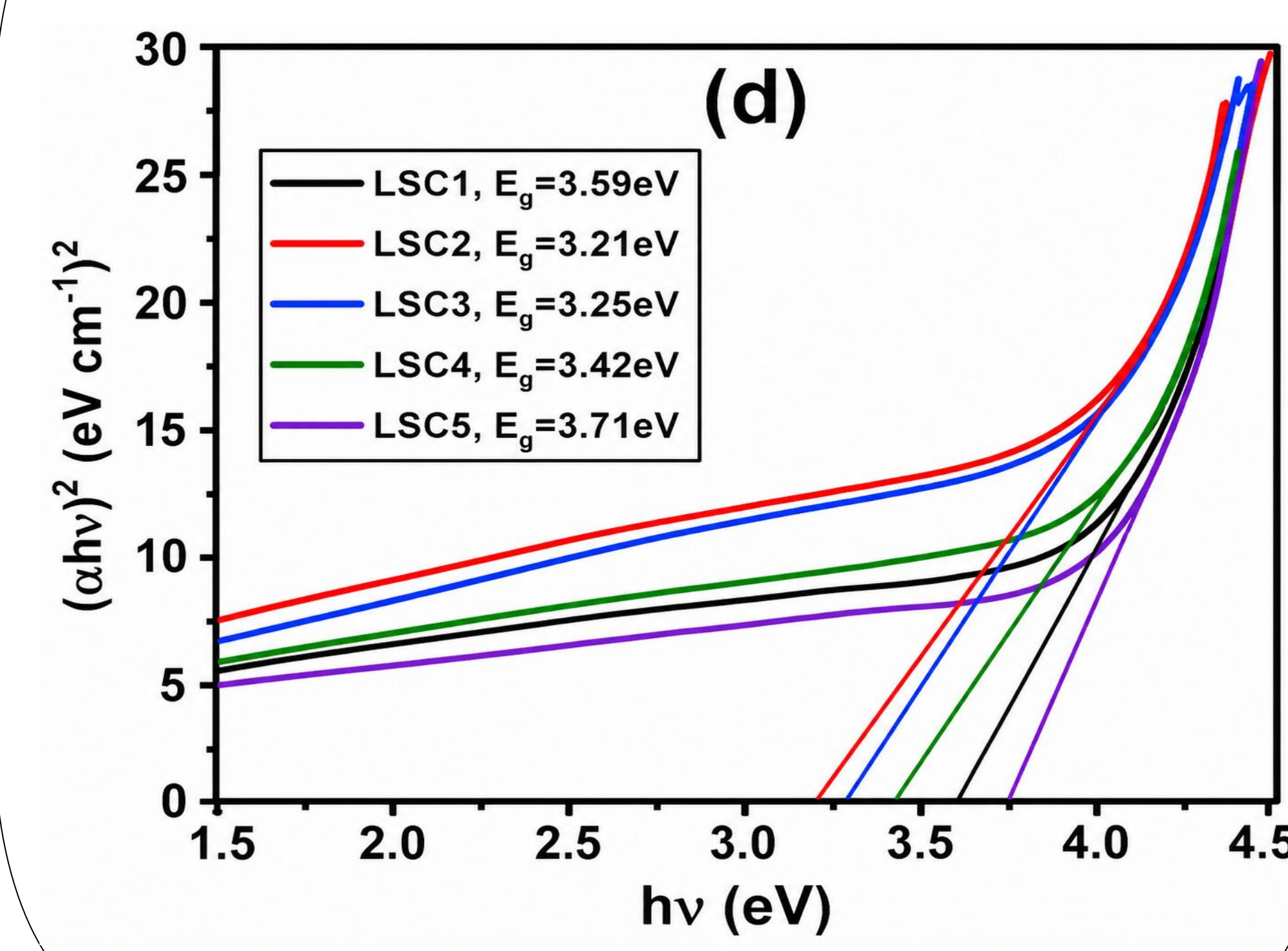
Dielectric Properties



Nyquist Plots



Optical Properties



CONCLUSION

- Faster OER kinetics/ improved Dielectric and optical properties.
- Bandgap - **Non-Linear Optics Apps.**
- Doping improves the dielectric parameters of **LSC5**; efficient for **supercapacitor & ultracapacitor** applications with **greater polarizability.**