**Supporting Information**

**Synthesis of Perovskite-Type High-Entropy Oxides as Potential Candidates for Oxygen Evolution**

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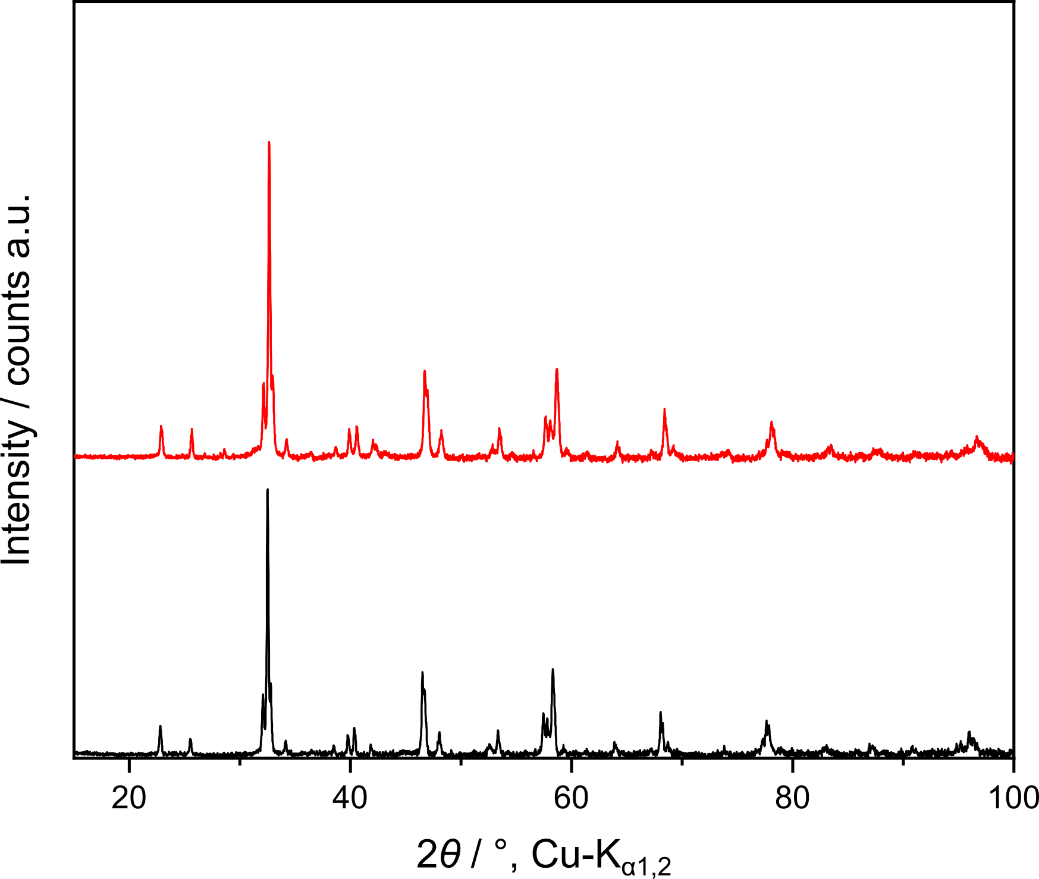
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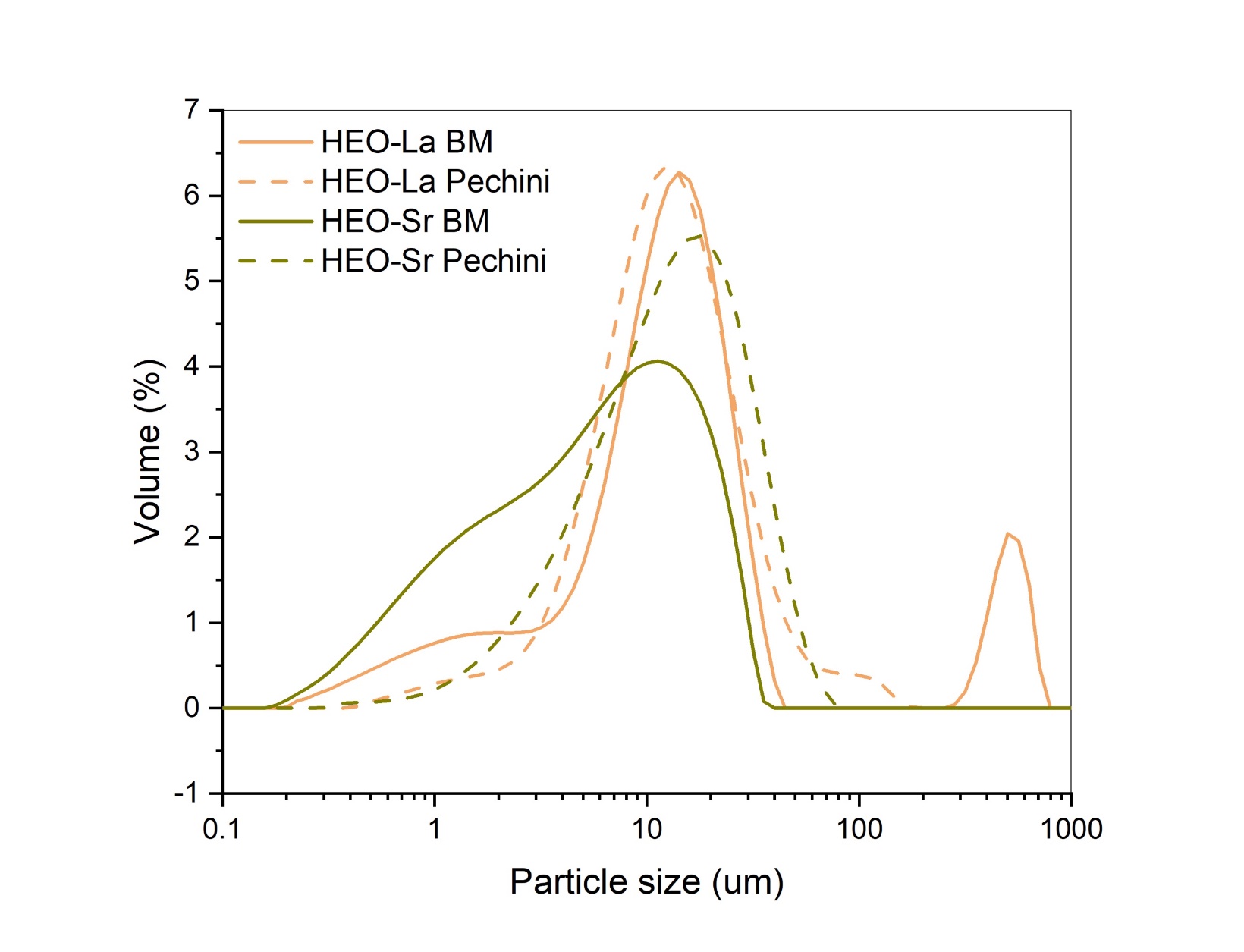
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**Table S1.**Refined structural parameters a, b, c, V for HEO-La and HEO-Sr perovskite materials prepared by ball milling or Pechini method.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **HEO-La\_BM** | **HEO-Sr\_BM** | **HEO-La\_PM; 900°C** | **HEO-Sr\_PM; 900 °C** | **HEO-La\_PM; 1200 °C** | **HEO-Sr\_PM; 1200 °C** |
| **Space group** | *Pbnm* | *Pbnm* | *Pbnm* | *Pbnm* | *Pbnm* | *Pbnm* |
| ***a* / Å** | 5.3748(6) | 5.3554(4) | 5.3660(6) | 5.3211(7) | 5.3596(3) | 5.3310(9) |
| ***b* / Å** | 5.5534(7) | 5.5610(8) | 5.5057(5) | 5.4989(7) | 5.5007(3) | 5.4909(8) |
| ***c* / Å** | 7.6697(8) | 7.647(1) | 7.6382(7) | 7.584(1) | 7.6291(4) | 7.596(1) |
| ***V* / Å3** | 228.93 (5) | 227.75(6) | 225.66(4) | 221.92(5) | 224.92(2) | 222.34(6) |



**Figure S1.** XRD patterns of HEO-La\_BM and HEO-Sr\_BM after calcination of the ball-milled synthesized materials at 1200 °C for 12 h.



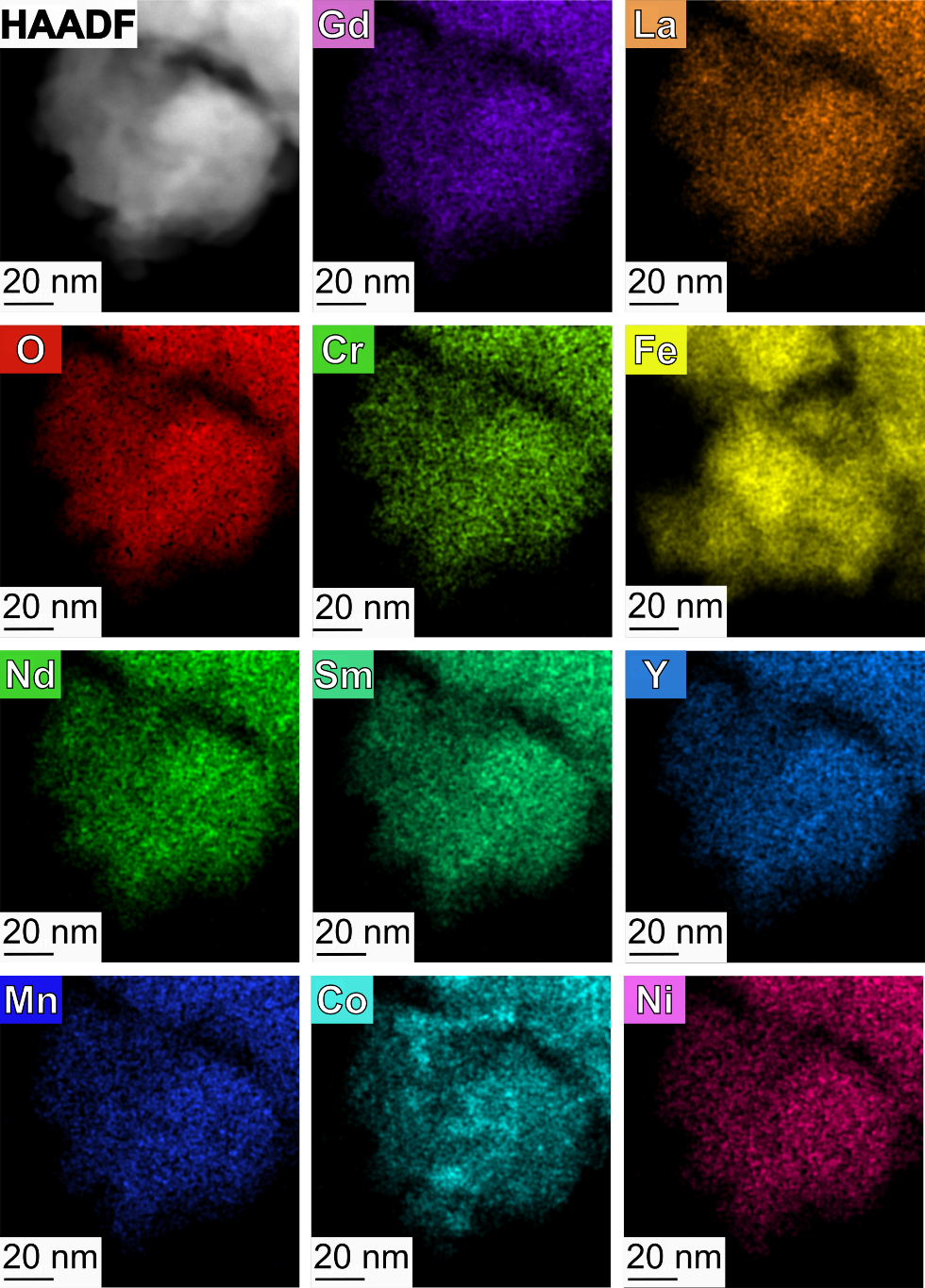
**Figure S2.** Particle size distribution of HEO-La and HEO-Sr powders synthesized by ball milling and Pechini method.

**Table S2.** ICP-OES results for HEO-La synthesized using ball milling and Pechini method (SD = standard deviation).

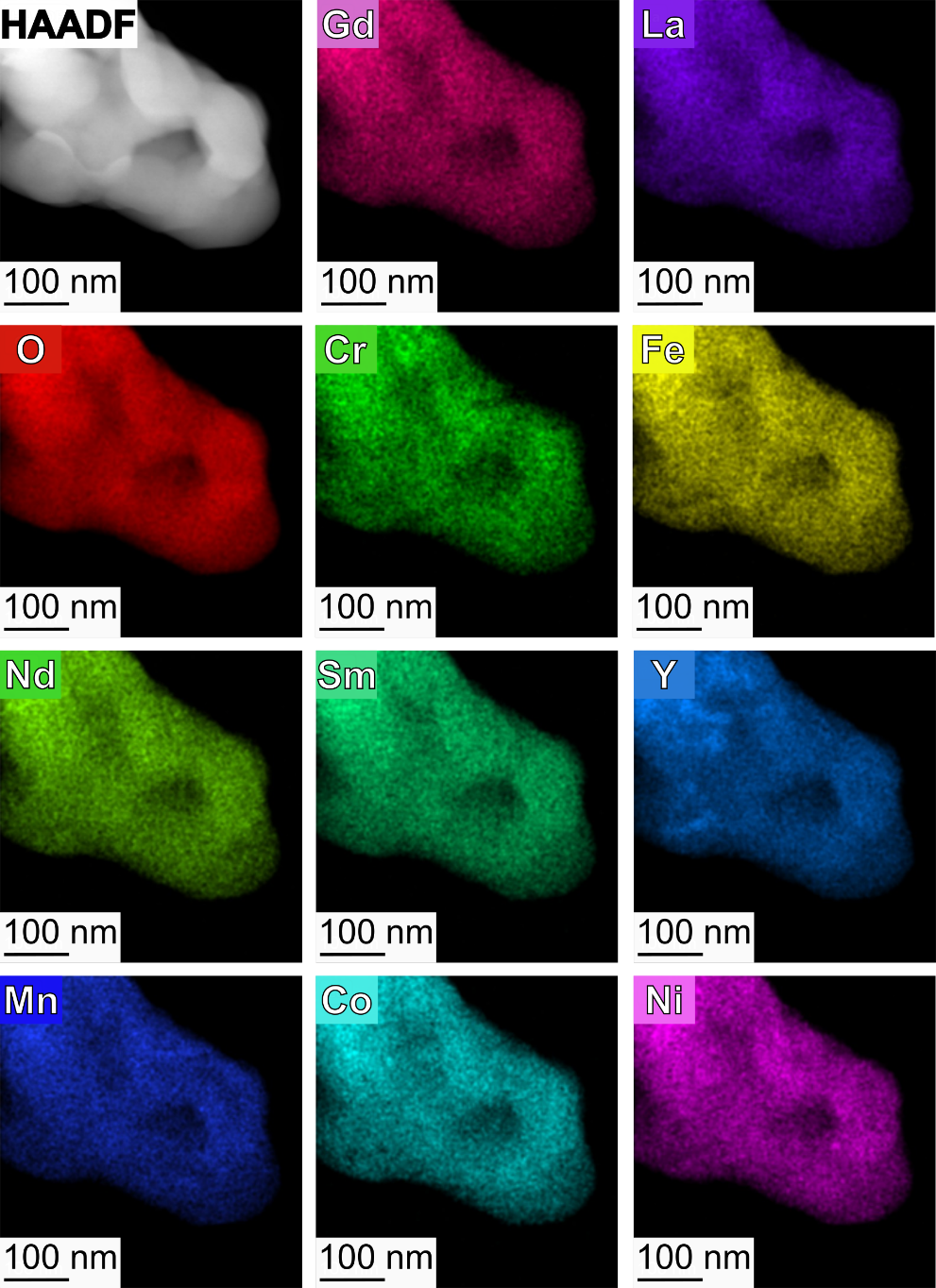
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Mass (Pechini) [wt.%]** | **n**  **[mol]** | **SD**  **[%]** | **Mass (BM) [wt.%]** | **n**  **[mol]** | **SD**  **[%]** |
| Gd | 14.01 | 0.21 | 0.09 | 13.43 | 0.21 | 0.15 |
| **La** | 11.90 | 0.21 | 0.02 | 11.36 | 0.19 | 0.06 |
| Nd | 12.16 | 0.20 | 0.07 | 10.08 | **0.17** | 0.11 |
| Sm | 14.92 | 0.24 | 0.09 | 14.17 | 0.23 | 0.15 |
| Co | 4.99 | 0.20 | 0.02 | 4.73 | 0.19 | 0.04 |
| Cr | 4.53 | 0.21 | 0.01 | 3.68 | **0.17** | 0.04 |
| Fe | 4.70 | 0.20 | 0.02 | 4.52 | 0.19 | 0.07 |
| Mn | 4.91 | 0.21 | 0.03 | 4.68 | 0.20 | 0.04 |
| Ni | 5.15 | 0.21 | 0.02 | 5.07 | 0.21 | 0.05 |
| Y | 7.96 | 0.22 | 0.02 | 7.53 | 0.20 | 0.06 |

**Table S3.** ICP-OES results for HEO-Sr synthesized using ball milling and Pechini method (SD = standard deviation).

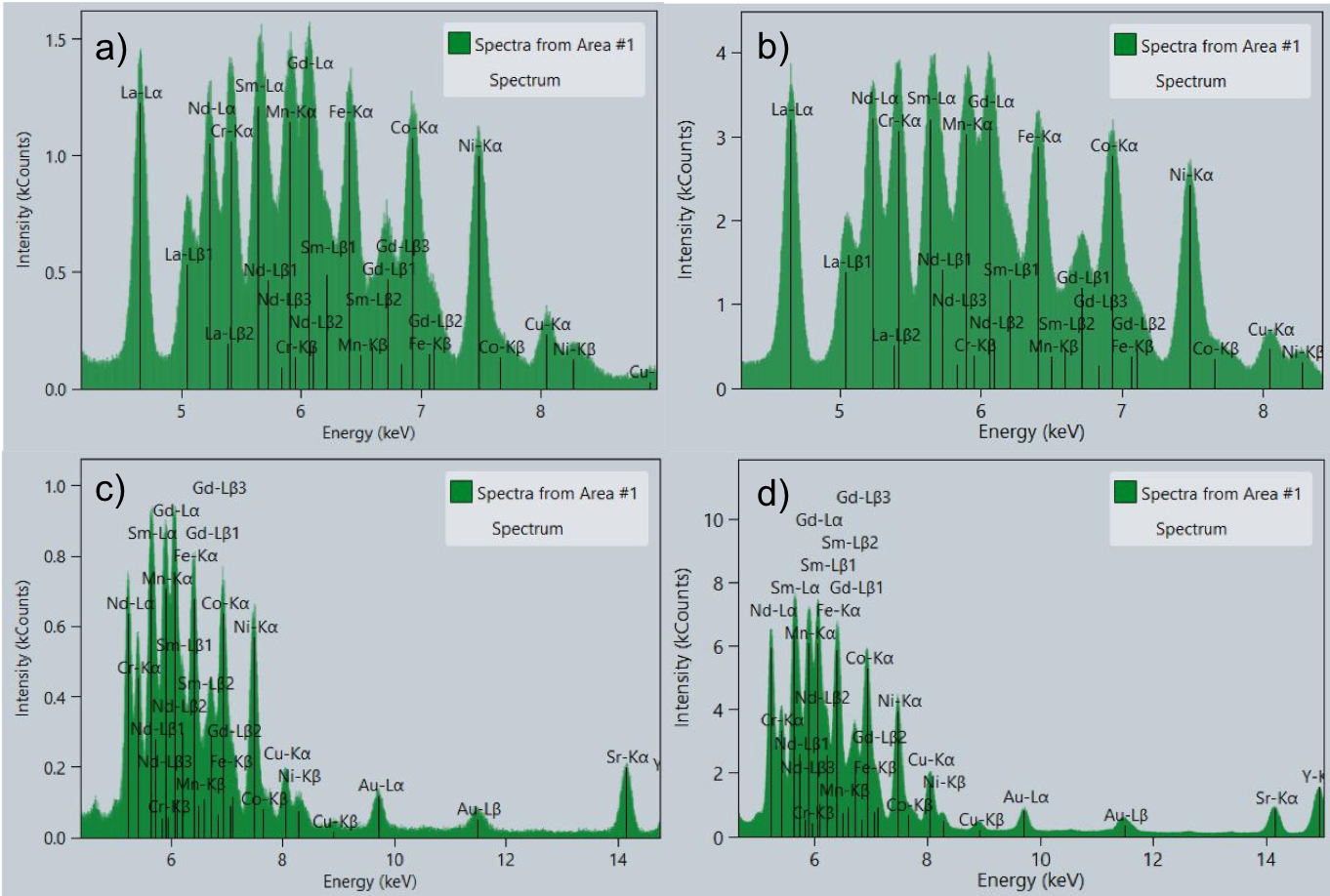
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Mass (Pechini) [wt.%]** | **n [mol]** | **SD**  **[%]** | **Mass (BM) [wt.%]** | **n**  **[mol]** | **SD**  **[%]** |
| Gd | 14.84 | 0.22 | 0.10 | 14.26 | 0.20 | 0.28 |
| **Sr** | 7.74 | 0.20 | 0.10 | 7.41 | 0.19 | 0.25 |
| Nd | 12.91 | 0.21 | 0.12 | 10.90 | **0.17** | 0.34 |
| Sm | 15.83 | 0.24 | 0.14 | 15.02 | 0.23 | 0.42 |
| Co | 5.28 | 0.21 | 0.04 | 5.23 | 0.20 | 0.30 |
| Cr | 4.78 | 0.21 | 0.02 | 2.99 | **0.13** | 0.14 |
| Fe | 4.99 | 0.21 | 0.10 | 4.96 | 0.20 | 0.30 |
| Mn | 5.07 | 0.21 | 0.05 | 4.88 | 0.20 | 0.09 |
| Ni | 5.40 | 0.21 | 0.06 | 5.35 | 0.21 | 0.17 |
| Y | 7.91 | 0.20 | 0.06 | 7.44 | 0.19 | 0.20 |



**Figure S3.** HAADF images and EDX analysis HEO-La\_BM.



**Figure S4.** HAADF images and EDX analysis HEO-La\_PM. HEO-La\_PM was calcined at 1200 °C for 12 h.

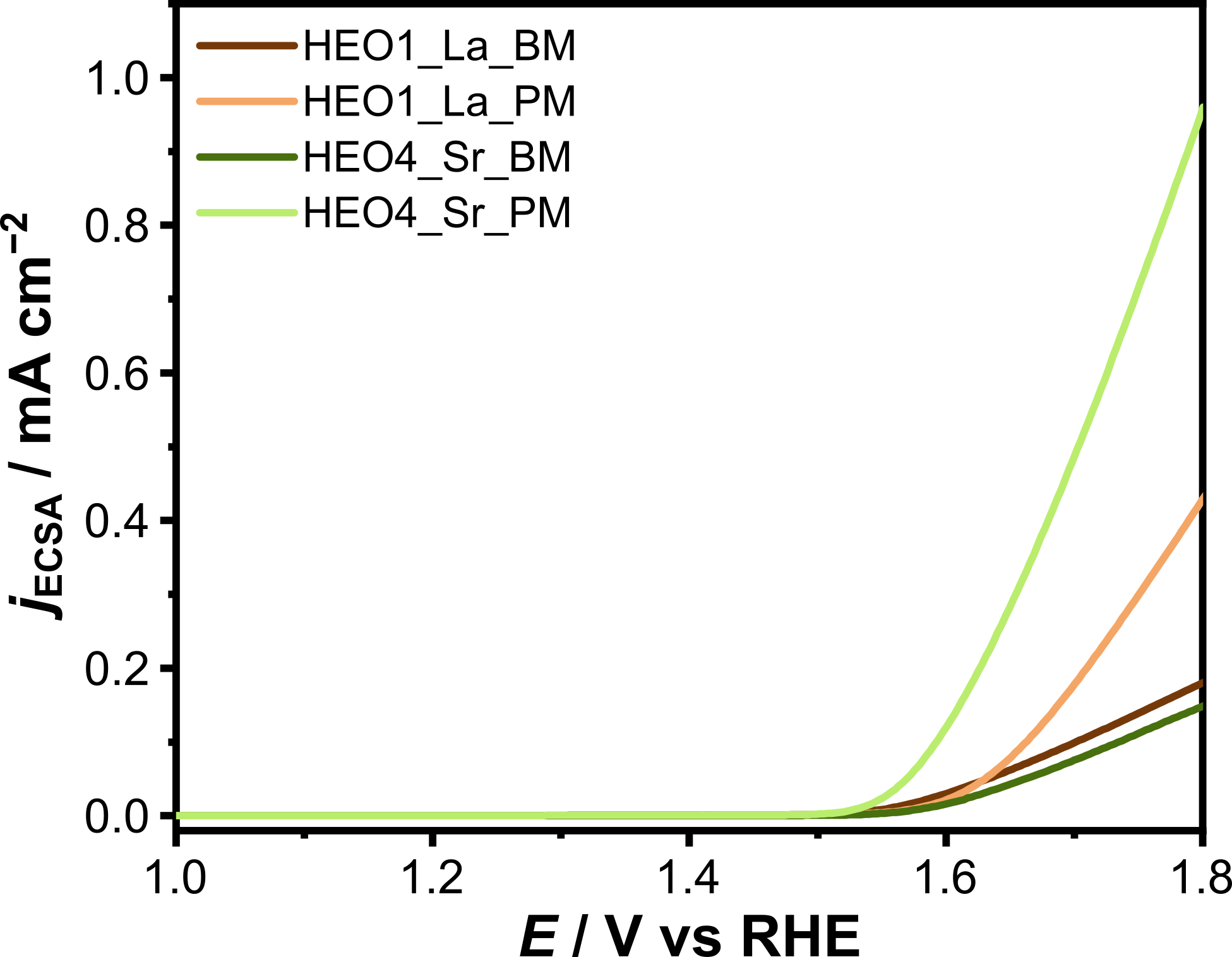


**Figure S5.** EDX spectra for a) HEO-La\_BM, b) HEO-La\_PM, c) HEO-Sr\_BM and d) HEO-Sr\_PM.

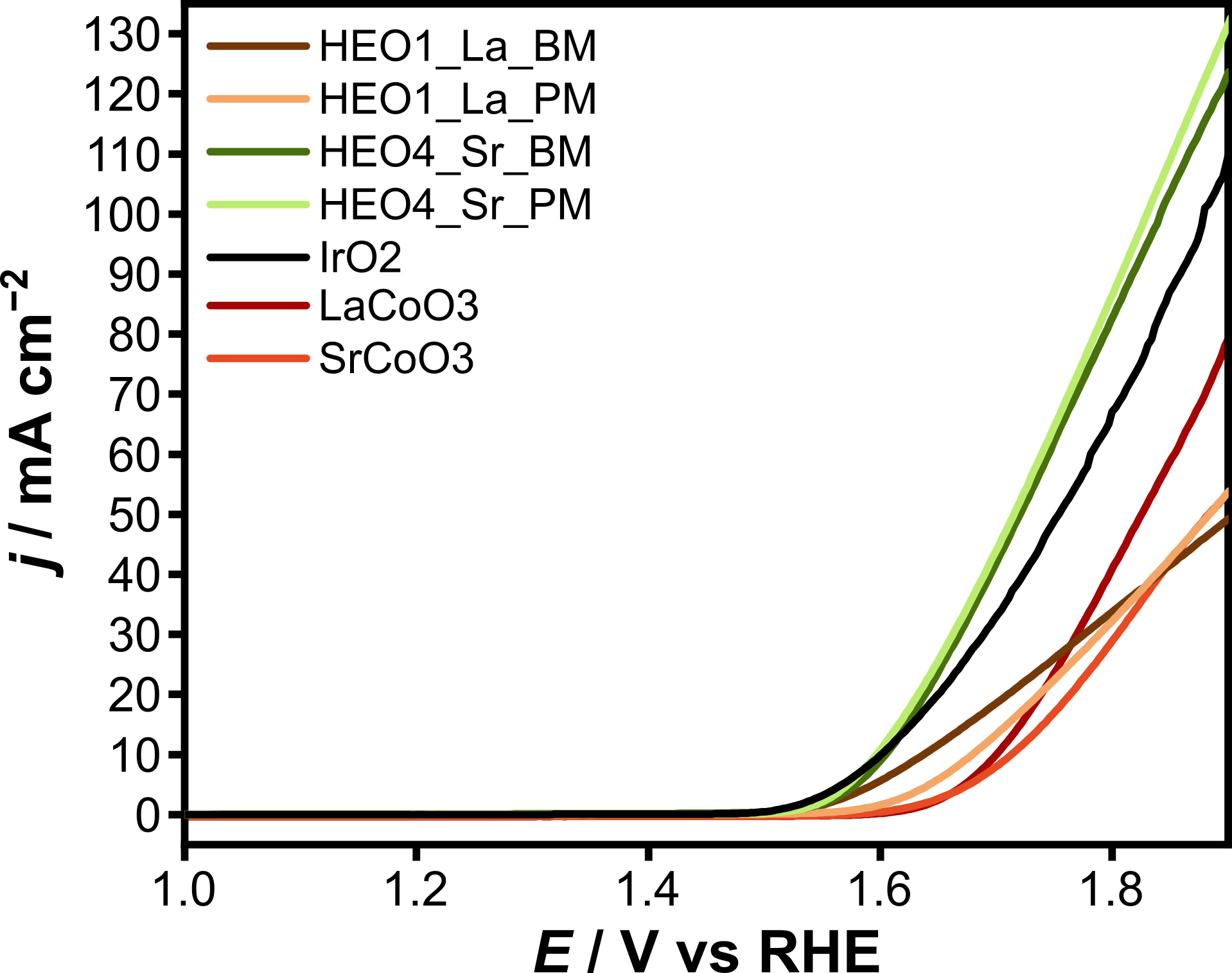
Ein Bild, das draußen, Tag enthält.

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**Figure S6.** CV curves at different scan rates (5, 10, 20, 40, 60 mV s−1) of a) HEO-La\_BM, b) HEO-La\_PM, c) HEO-Sr\_BM, and d) HEO-Sr\_PM



**Figure S7.** LSV curves normalized to the ECSA.



**Figure S8.** LSV polarization plot toward the OER for different electrocatalysts in 1 M KOH at a scan rate of 5 mV s-1.