Pore-Size-Engineered Vertically Aligned CoFe Layered Double Hydroxides on Carbon Supports: Correlation Between Structure and Activity for Oxygen Evolution

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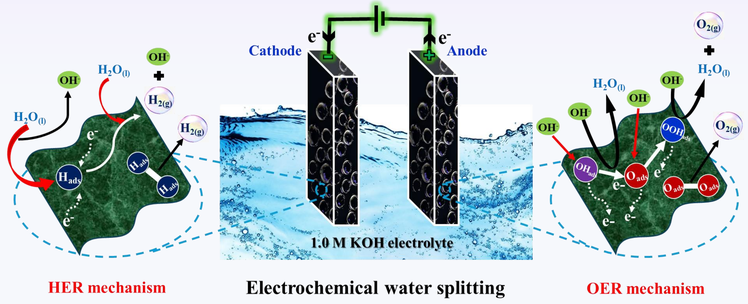
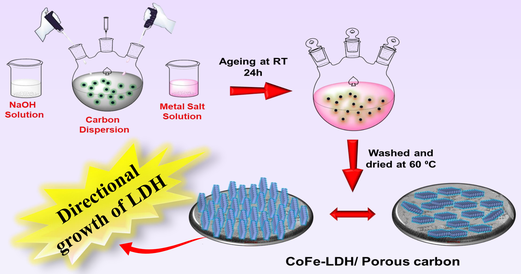
1. Introduction

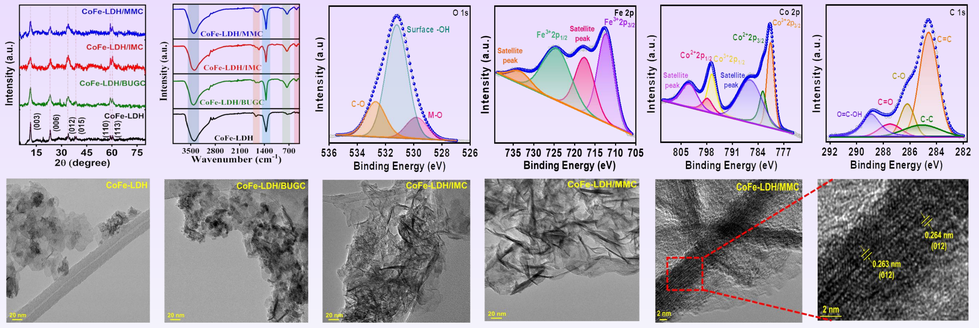
- Due to a consistent increase in global energy consumption and drastic environmental issues, there is an urgent demand for renewable and highly efficient devices for energy conversion.
- Water electrolysis is a promising and environment- friendly technology for the production of hydrogen, which is considered as a green fuel.
- LDH exposed active sites, which facilitate electron transport properties in electrocatalysis.
- Herein, CoFe-LDH-based carbon materials have been synthesized by the co-precipitation method, wherein the growth of LDH on the porous carbon materials has been investigated.



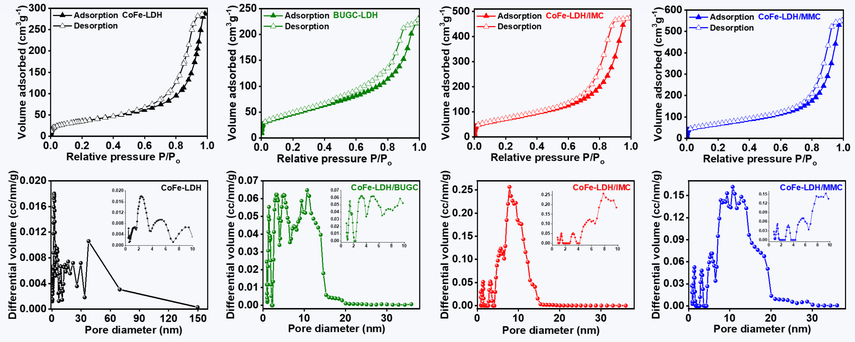
2. Catalyst Synthesis



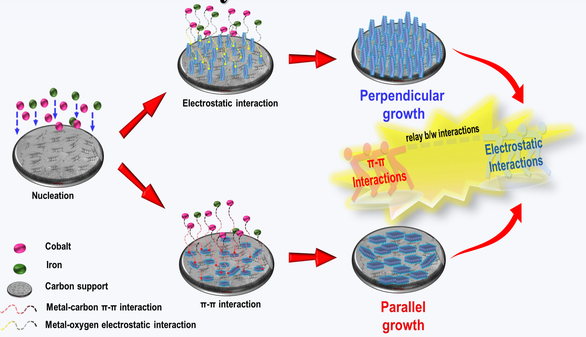
3. Catalyst Characterization



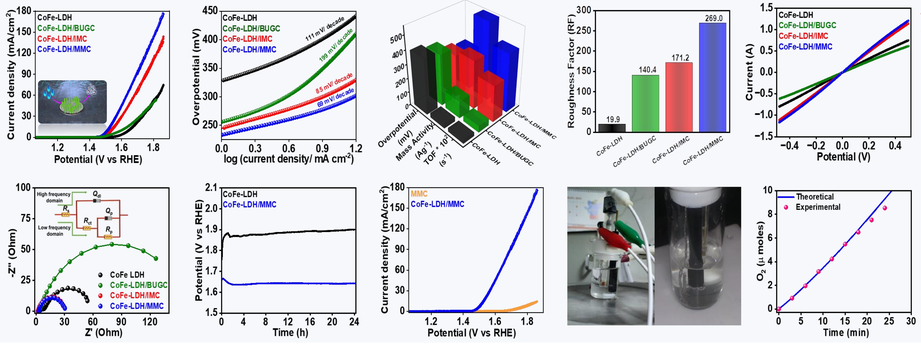
4. Surface area and Porosity measurement



5. *In situ* crystallization mechanism



6. Electrochemical Results



7. Conclusions

- CoFe –LDH/MMC exhibited a remarkable OER activity with a mass activity of 559.2 A g^{-1}, TOF of 4.22 s^{-1} and a RF value of 269.
- A vertically arranged LDH nanosheets were formed, which resulted in narrow mesoporous pore distribution due to dominant short- range electrostatic interactions.
- The increased electron contribution to the 3d orbital of metal from carbon weakened the metal-oxygen bond and facilitated the formation of O–O bonds during the OER.

8. References

1. Aggarwal, P.; Mehra, P.; Paul, A., *ACS Appl. Nano Mater.* 2024, *7*, 9532-9541. **(Most Read Article)**
2. Jose, N. A.; Zeng, H. C.; Lapkin, A. A., *Nat. Commun.* 2018, *9*, 4913.
3. Aggarwal, P.; Singh, B.; Paul, A., *Mater. Adv.* 2023, *4*, 4377-4389.

9. Acknowledgement

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