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Effect of calcination on the energy storage capacity metal-organic framework-derived cobalt oxides

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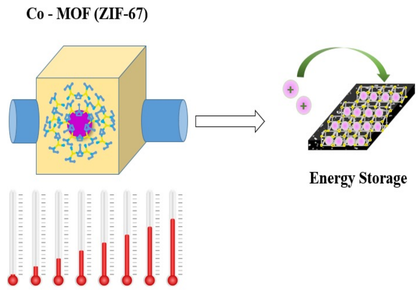
Introduction

- Supercapacitors are known as effective energy storage devices with high-power density and long cycle life.
- Various structure and morphology modification have been conducted to improve the energy storage performances.
- The construction of metal-organic frameworks (MOFs) have been receiving much attention to develop the performance of energy storage materials due to a large surface area and high porosity.
- The change of calcination temperature can affect the structure and morphology of the materials, which results in the different electrocatalytic properties.
- Our group synthesized the MOF-derived cobalt oxide at the various calcination temperatures to find the most suitable calcination temperature for the energy storage properties.

Experimental



Morphology

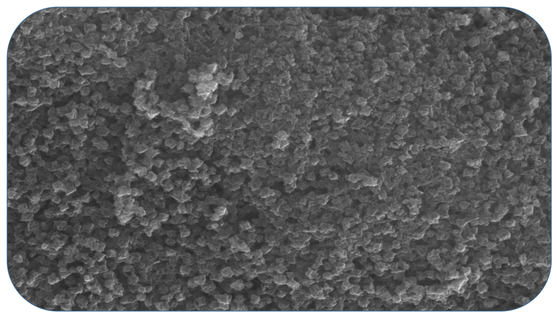


Figure: the morphology of Co-MOF 600

Results and discussion

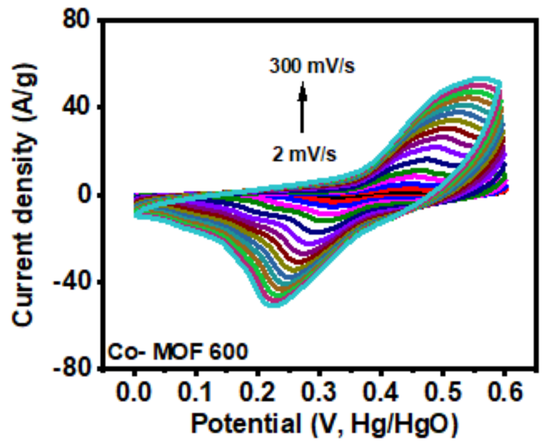


Figure: CV curves of Co-MOF 600 electrode at various scan rates from 2-300 mV/s

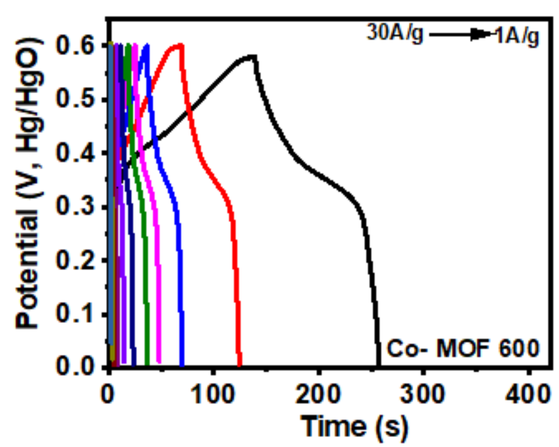


Figure: GCD curves of Co-MOF 600 electrode at various current density from 1-30 A/g

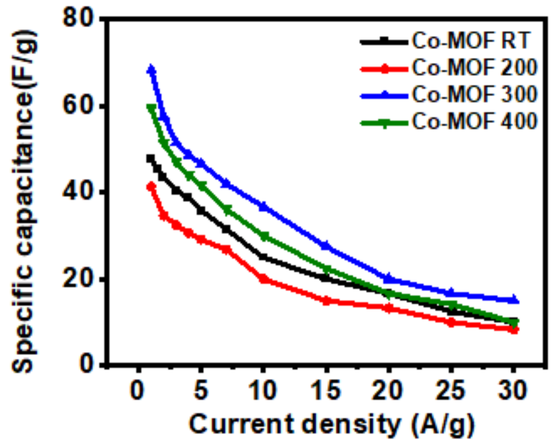


Figure: The relationship between specific capacitance and current density of Co-MOF RT-400 electrodes

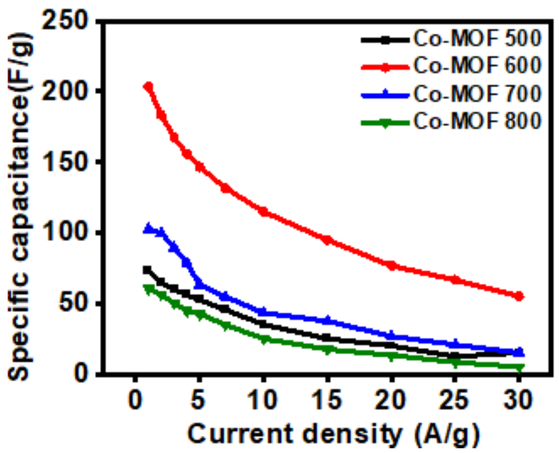
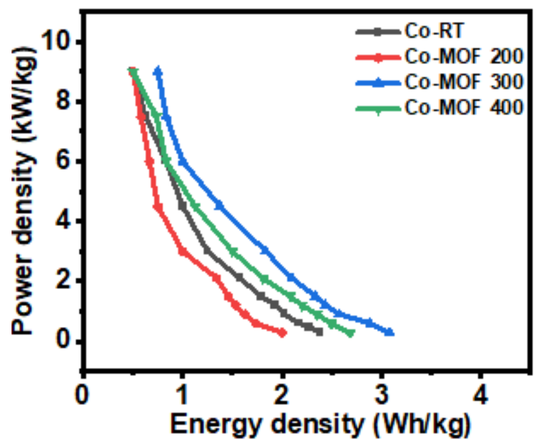


Figure: The relationship between specific capacitance and current density of Co-MOF 500-800 electrodes



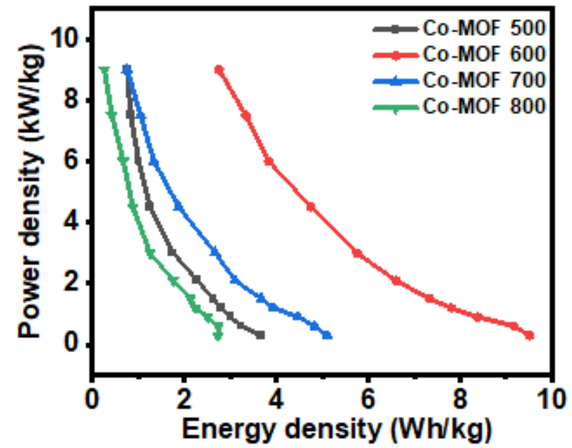


Figure: The Rogne plots of Co-MOF RT-400 electrodes, and Co-MOF 500-800 electrodes

Conclusion and Future work

- ✓ The metal organic framework (MOF)-derived cobalt oxide materials were prepared at various calcination temperature.
- ✓ The different calcination temperature affect the energy storage property of the Co-MOF materials.
- ✓ At the current density of 1 A/g, the Co-MOF 600 electrode achieved the specific capacitance of 203 F/g.

Future work: Assemble the coin cell using the Co-MOF 600 material.

Acknowledgement

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