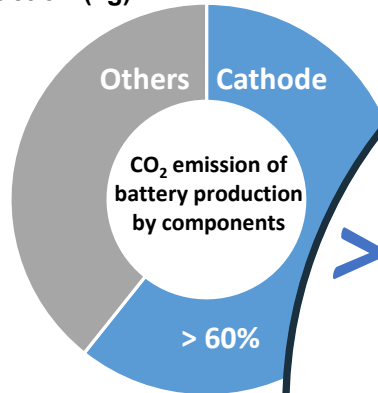
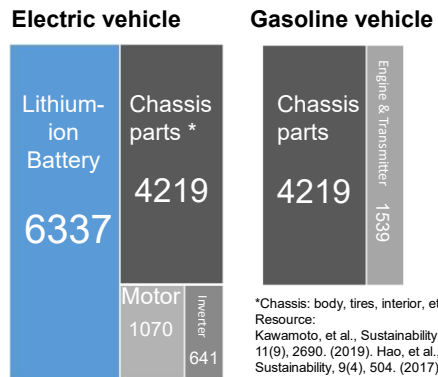


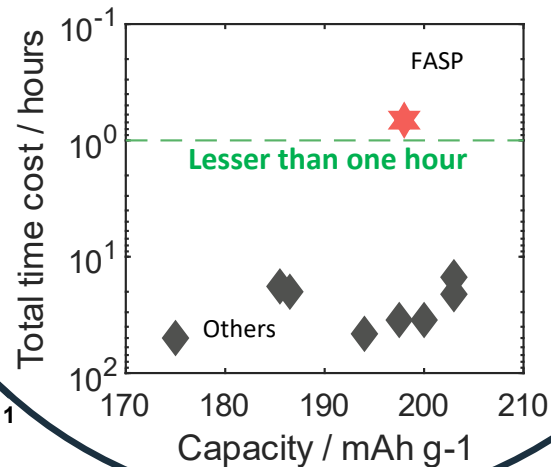
Introduction

Electric vehicles are considered carbon-free but battery production emits CO₂ extensively

CO₂ emission during a vehicle production (kg)

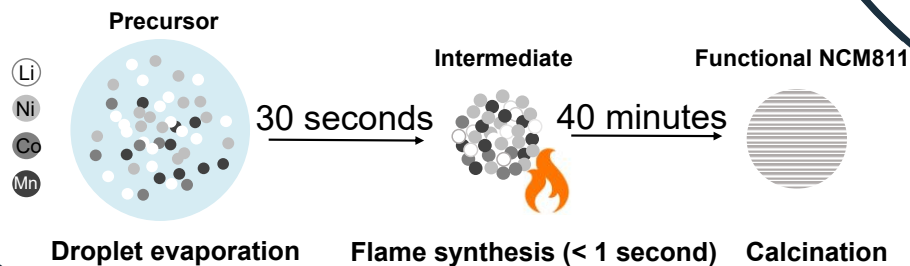


> 197 mAh/g -93% Carbon dioxide < 40 Minutes



Methods

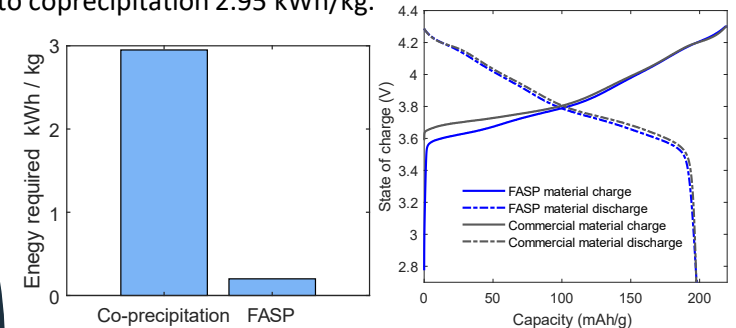
- Hydrogen fueled flame-assisted spray pyrolysis (FASP) for NCM811 cathode material
- Seamlessly incorporate lithium source addition alongside synthesis of Ni, Co, Mn framework within 30 seconds
- Calcination completed within 40 minutes at 850 °C



Research

Highlights and Impact

- Battery capacity: 197.5 mAh/g, comparable to commercial counterpart 197.9 mAh/g
- Calcination only takes 40 minutes, 60 times faster than traditional coprecipitation
- Reduces the required calcination energy to 0.2 kWh/kg cathode, in contrast to coprecipitation 2.95 kWh/kg.



Results

Conclusion & Outlook

- We proposed a fast synthesis method that reduces NCM811 material production to less than 1 hour.
- CO₂ emission in calcination step decreases by 93%.
- We believe FASP will lead to a cleaner, zero-carbon battery industry.

Acknowledgments

The author thanks MIT Deng Energy and Nanotechnology Group and support from Prof. Sili Deng, Dr. Jianan Zhang, and Maanasa Bhat.

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