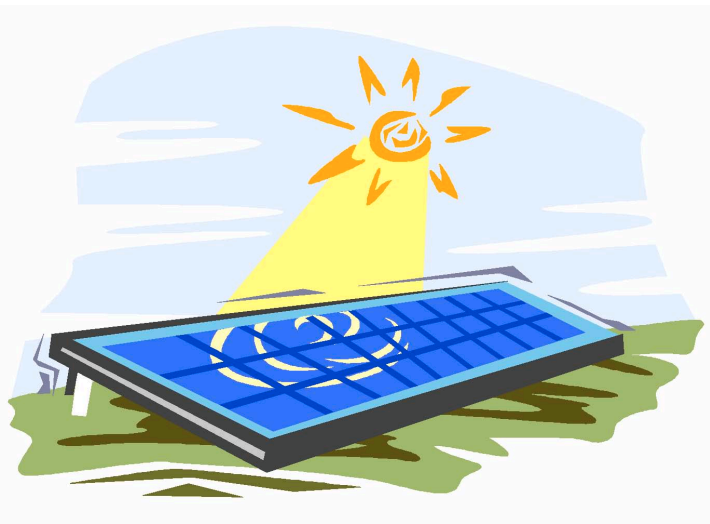
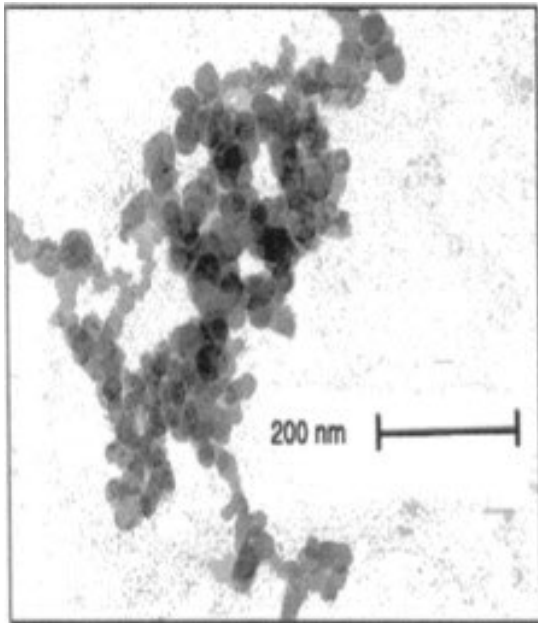


How to Make a Battery

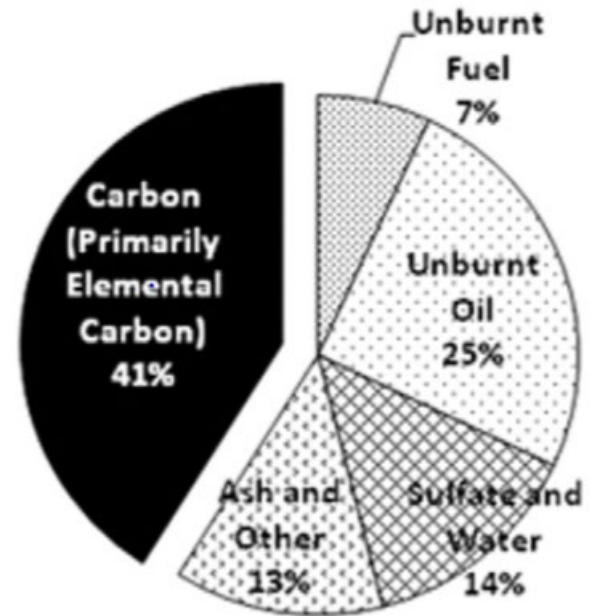


Gerald DeRogers, Omer Ozgur Capraz,
Batuhan Bal, Bertan Ozdogru





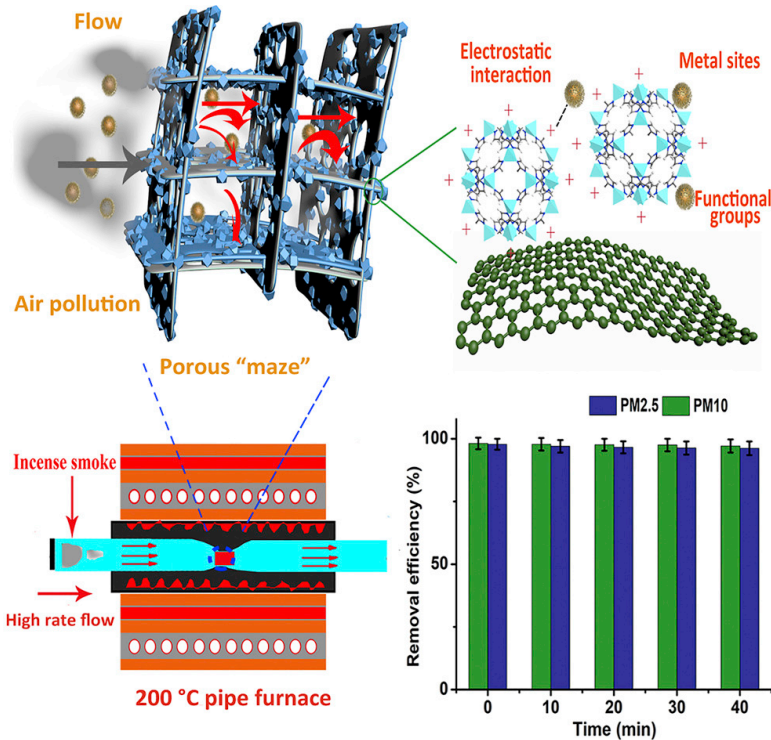
Example SEM Image of Diesel Particulate Matter (PM)¹



Typical Composition of PM¹

- Diesel PM collected from Diesel particulate filters (DPFs) and electrostatic precipitators (ESPs) is an unwanted industrial waste.

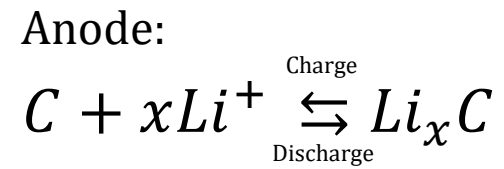
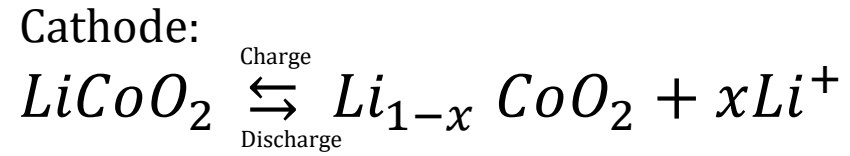
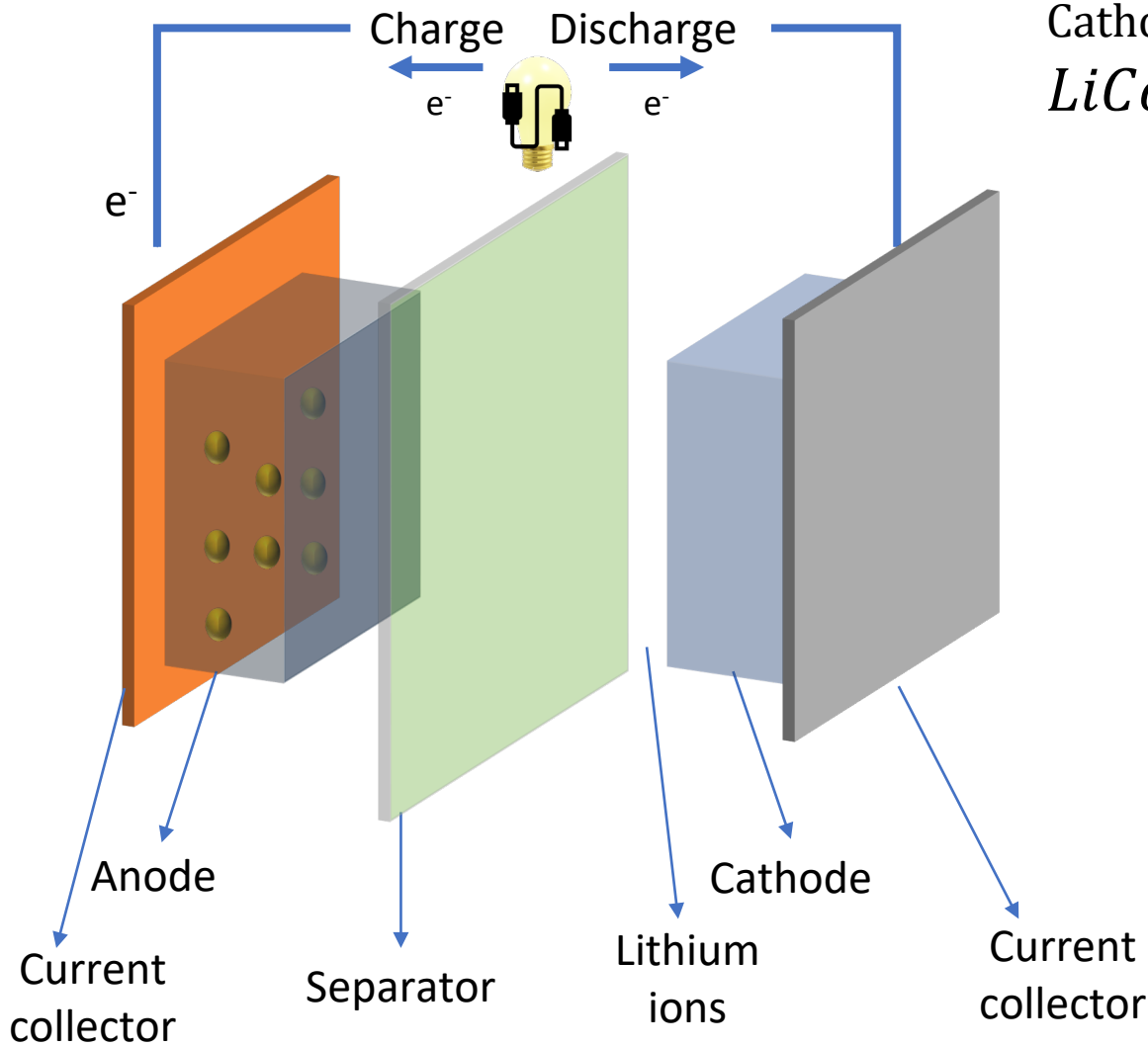
¹ McClellan, Roger O., Thomas W. Hesterberg, and John C. Wall. "Evaluation of carcinogenic hazard of diesel engine exhaust needs to consider revolutionary changes in diesel technology." *Regulatory Toxicology and Pharmacology* 63, no. 2 (2012): 225-258.

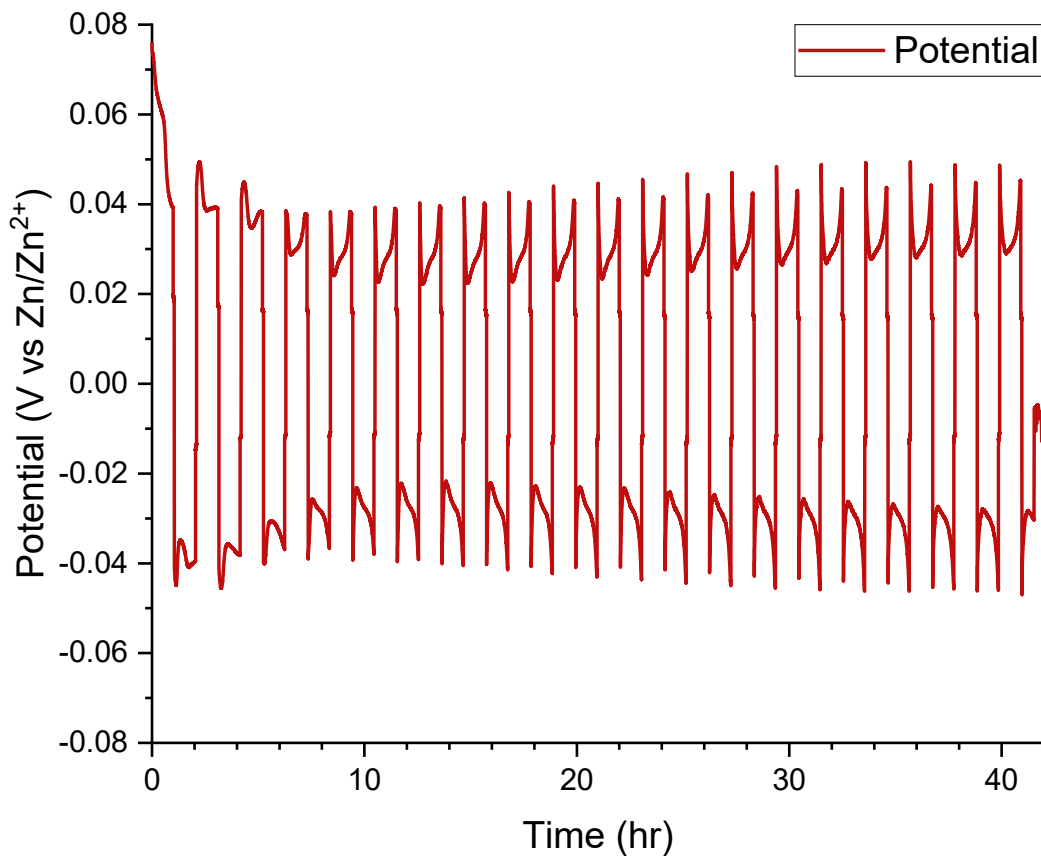


Example Method for PM Capture²

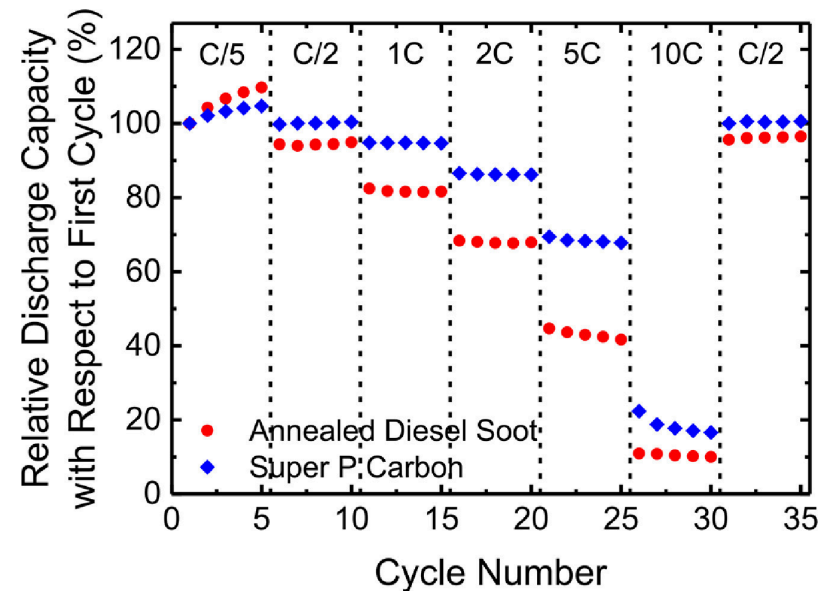
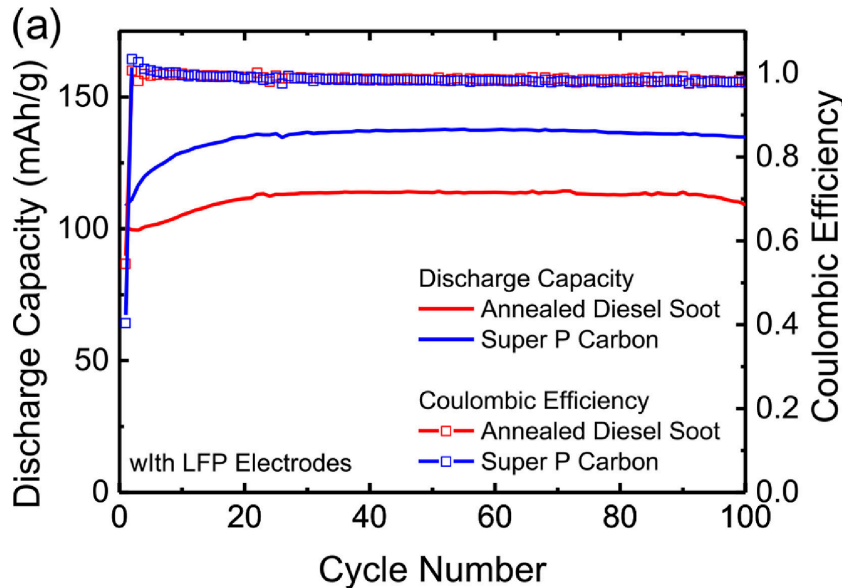
- One method to reduce the impact of the waste is repurposing.
- PM can be used as the carbon source for battery application.
- In order to use PM for batteries, one needs to know how a battery works.

² Mao, Jiajun, Yuxin Tang, Yandong Wang, Jianying Huang, Xiuli Dong, Zhong Chen, and Yuekun Lai. "Particulate matter capturing via naturally dried ZIF-8/graphene aerogels under harsh conditions." *IScience* 16 (2019): 133-144.





Electrochemical Response of Zn/Zn Symmetric Cell during Constant Current Application



(left) Discharging capacity and Coulombic Efficiency and (right) relative discharge capacity of LFP electrodes at different cycling rates from diesel soot and commercial carbon³

- Previously Dr Çapraz demonstrated the application of PM as anode material for Li-Ion batteries.
- In this study, we are proposing to investigate the electrochemical storage capacity of PM for Na-ion batteries.

- This material is based upon work supported by the National Science Foundation under the LSAMP Grant No. HRD-1911370." Or "Thank you in part to the National Science Foundation OK-LSAMP Program Grant No. HRD-1911370 OK-LSAMP