

# Investigations of Sulfur-Containing Organics/Polymers as Cathodes and Additives in Rechargeable Sodium–Sulfur Batteries

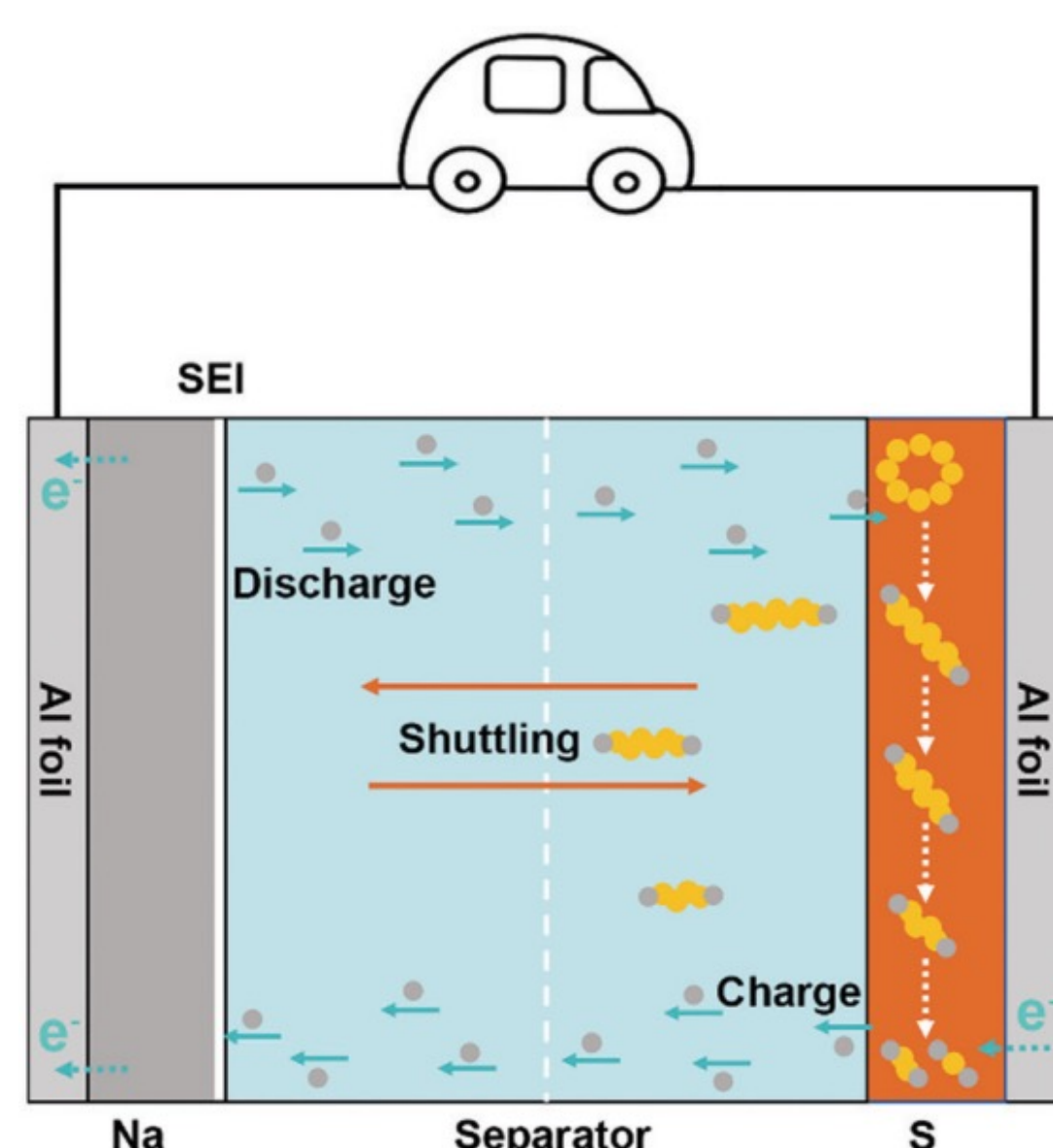
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## Sodium-Sulfur Battery (Na-S Battery)

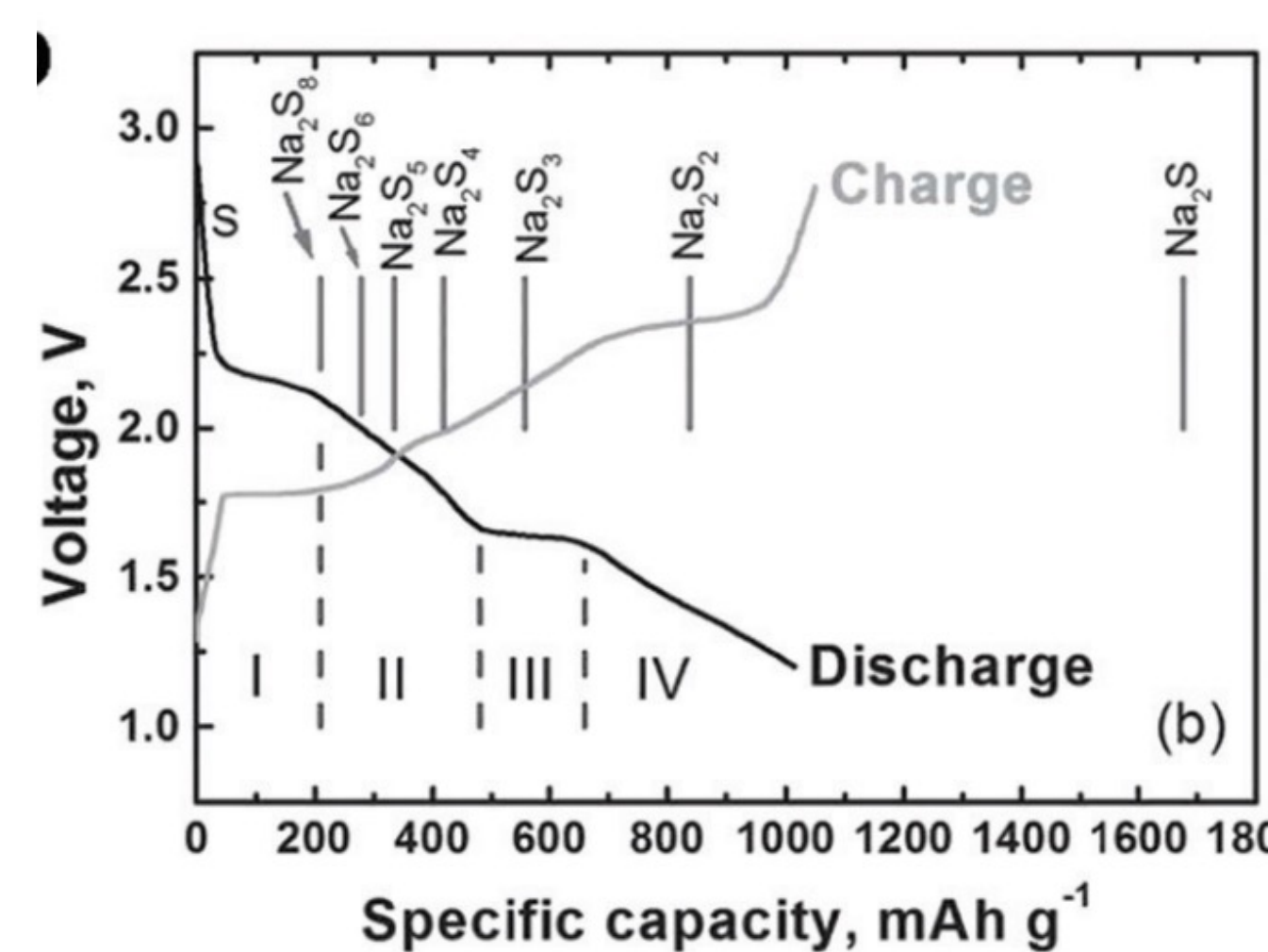
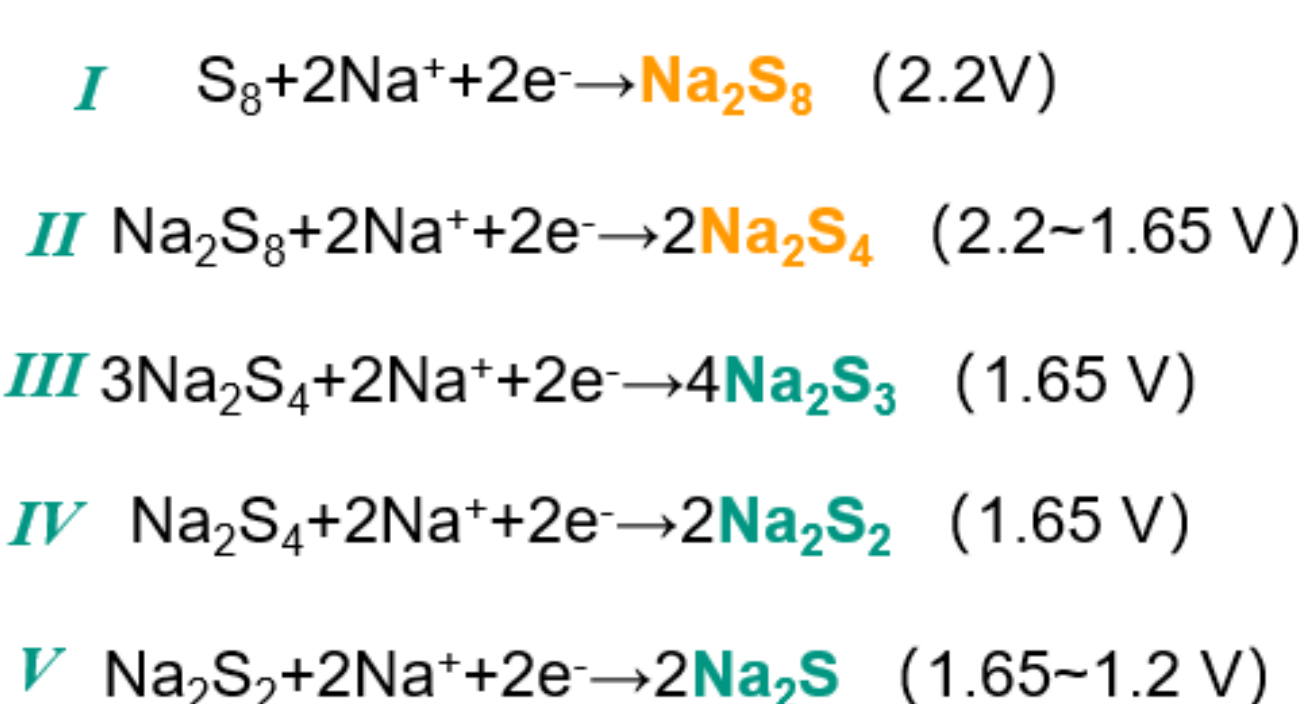
### Advantages

- High capacity (1675 mAh g<sup>-1</sup>)
- Rich reserves for sodium and sulfur
- Low cost
- Environment-friendliness

### Working mechanism

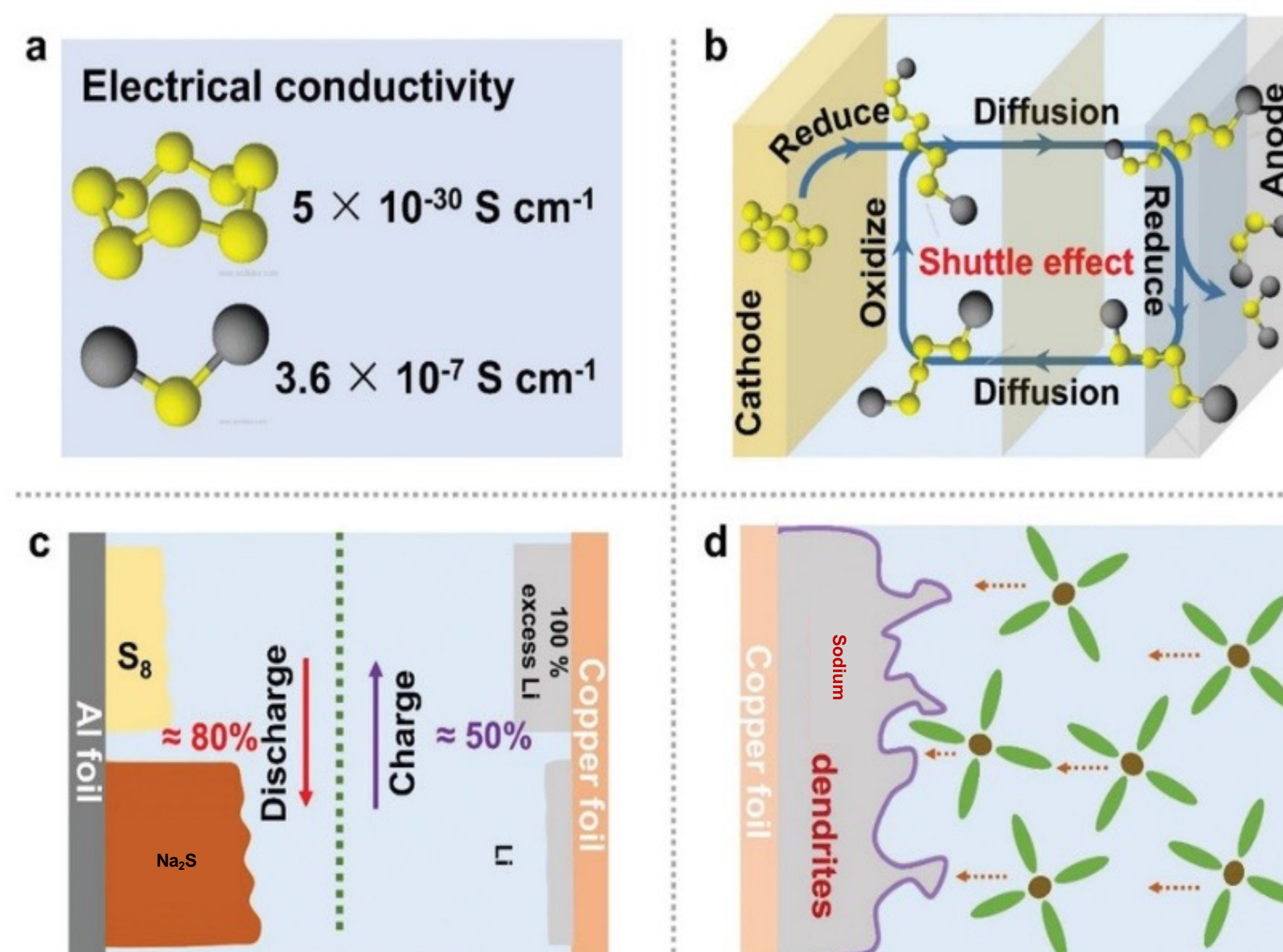


### solid–liquid–solid



## Challenges of Na-S Battery

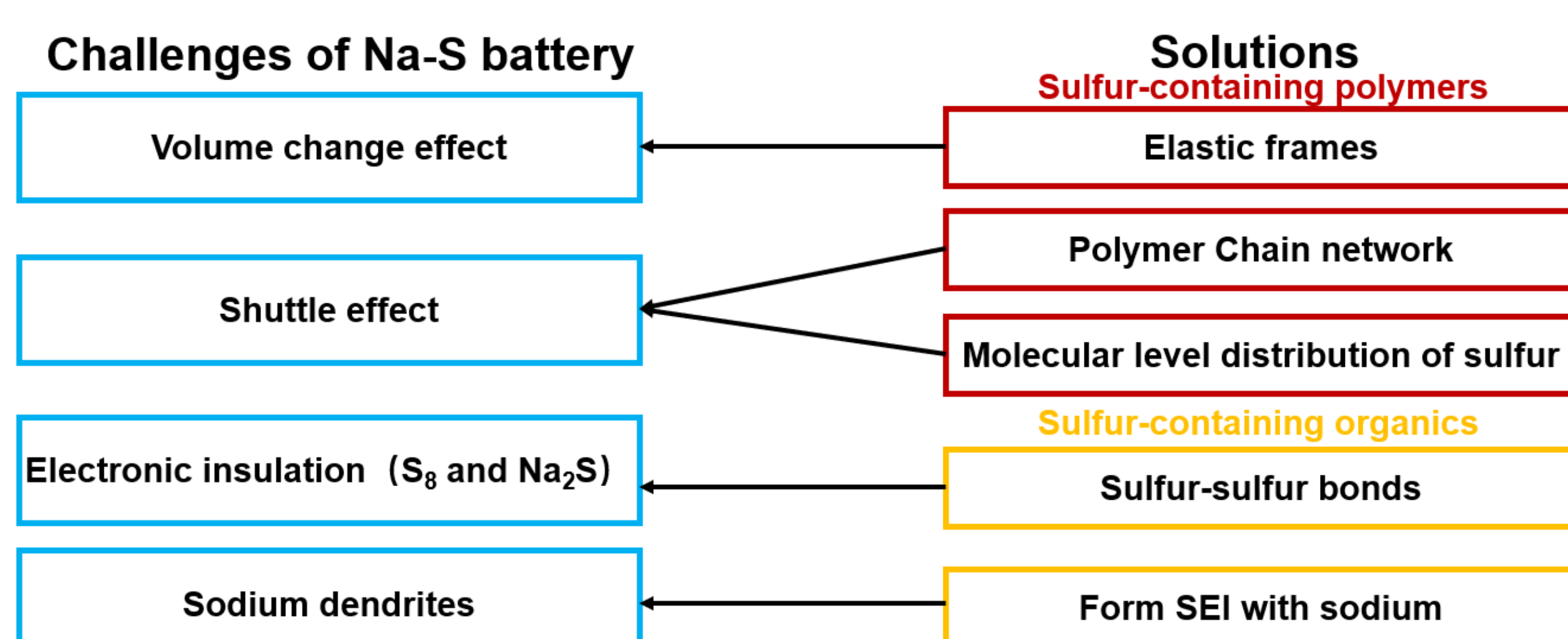
- **Electronic insulation:** Hinder charge conduction
- **Shuttle effect:** loss of sulfur, capacity attenuation, degradation of sodium anode
- **Volume change effect:** electrode degradation
- **Sodium dendrites:** short circuit, potential safety hazard



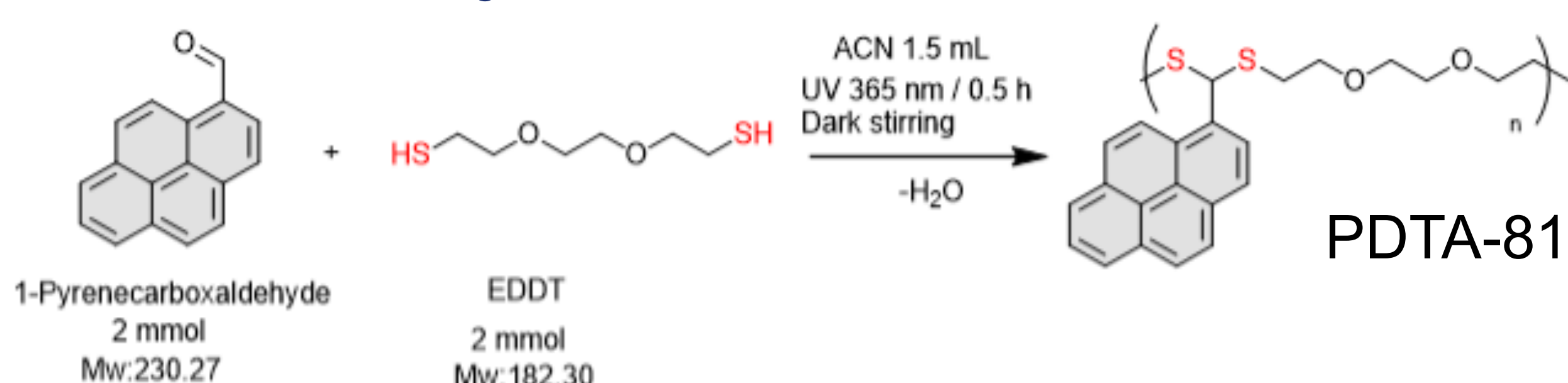
Energy & Environmental Science, 2015, 8 (12): 3477-3494

## Solve Challenges

by Sulfur-Containing Polymer/Organics



## Material Synthesis

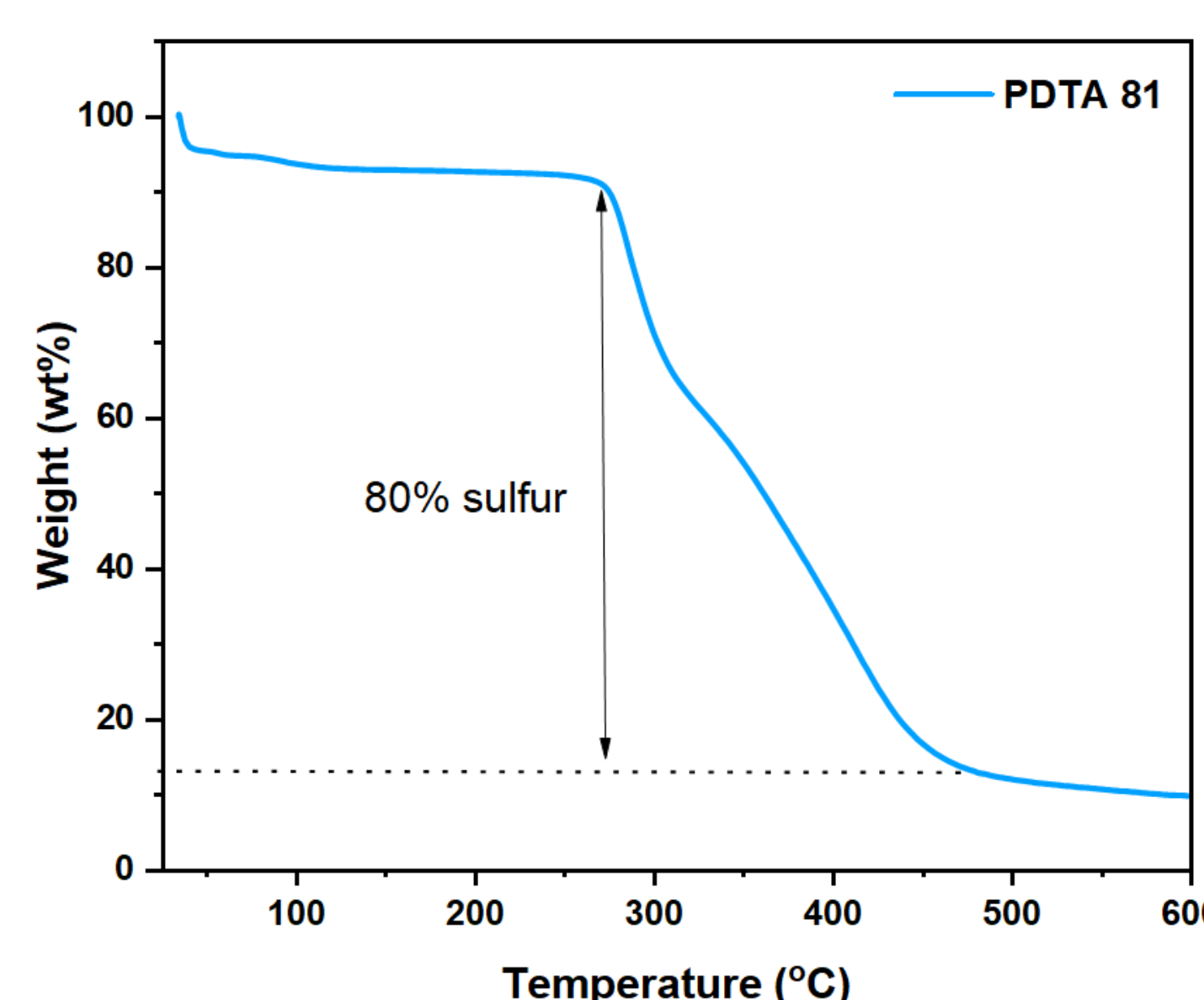


### Appropriate crosslinker:

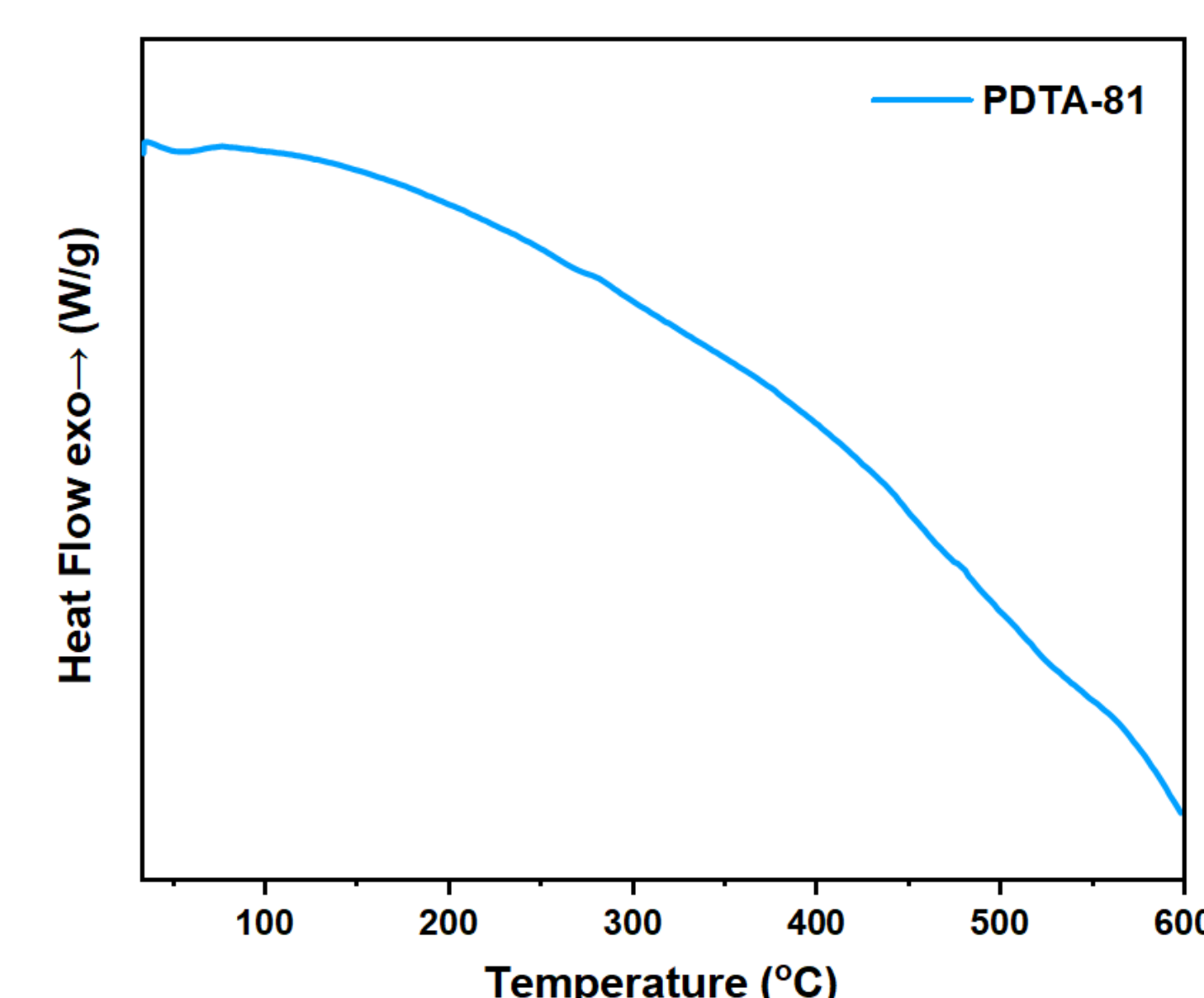
- Conjugated backbone
- Polymer chain network

## Characterization

### • TGA



### • DSC

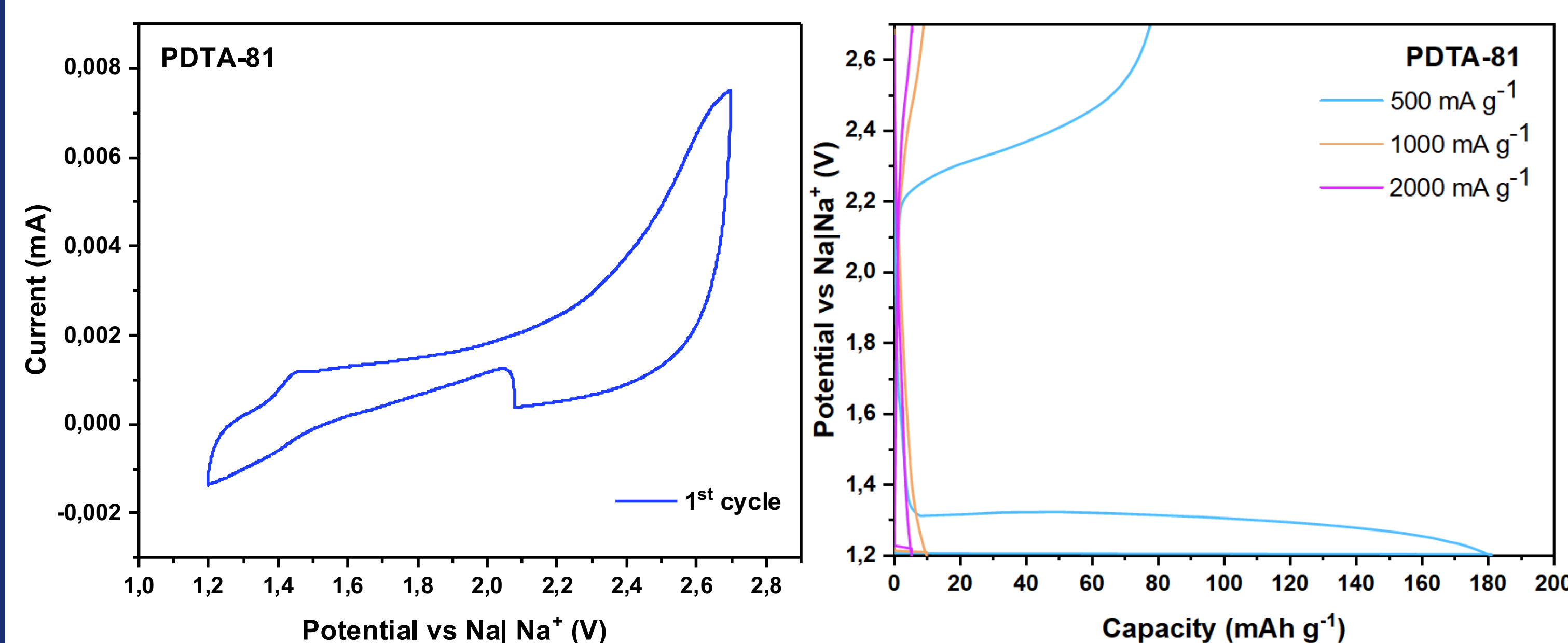


## Electrochemical performance test

**Working electrode:** PDTA-81: C65:LA133=6:3:1 (wt)

**Separator:** glass fiber **Electrolyte:** NaCF<sub>3</sub>SO<sub>3</sub> in TEGDME

**Counter electrode:** Sodium **Reference electrode:** Sodium



## Plan and Outlook

- Improve the capacity of Na-S battery with polymer cathode.
- Explore the working mechanism of polymer as cathode material.