

Recyclable sulfur polymers synthesised by electrochemical induced ring opening polymerisation

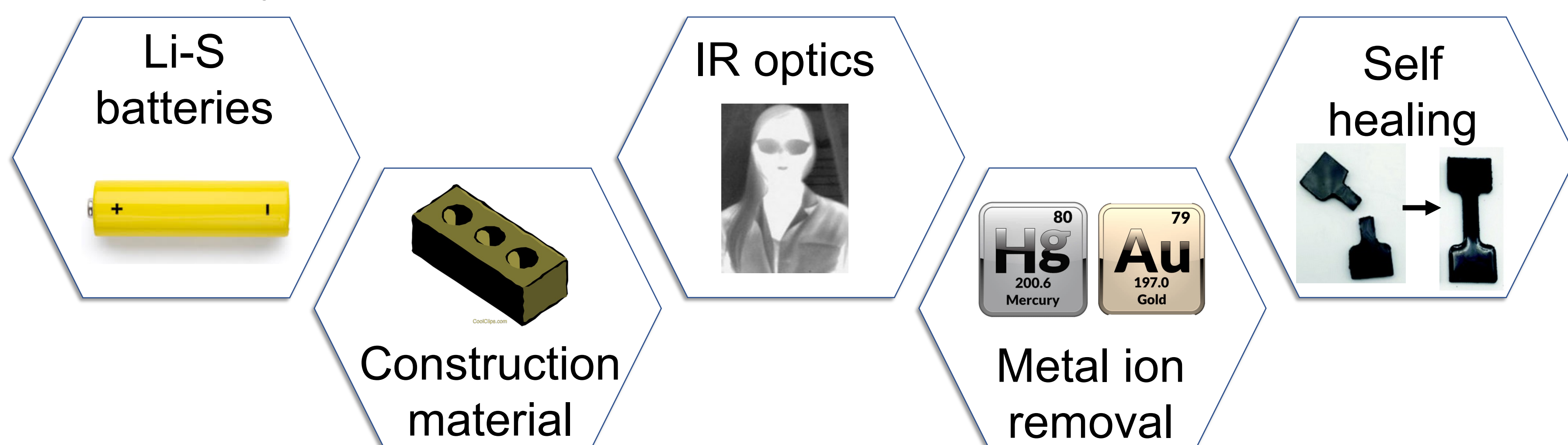
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Background

Sulfur polymer properties:

Redox active - Highly polarizable - Dynamic covalent characteristics
Utilizes industrial waste product

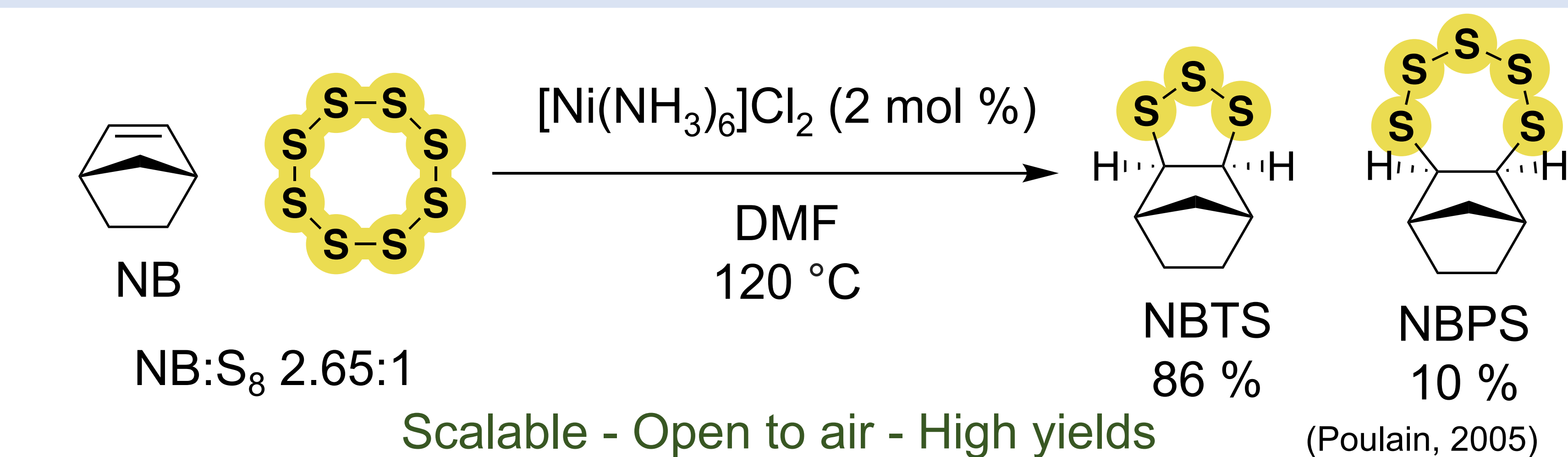
Sulfur polymer applications:



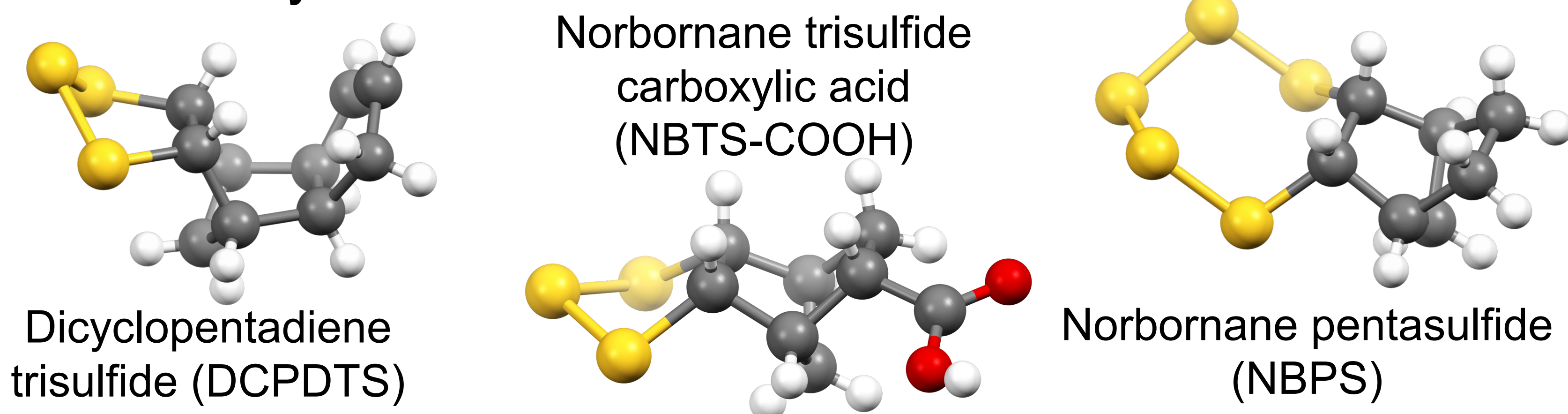
This work:

- New 'green' sulfur polymer synthesis method
- Thermally recyclable sulfur polymer

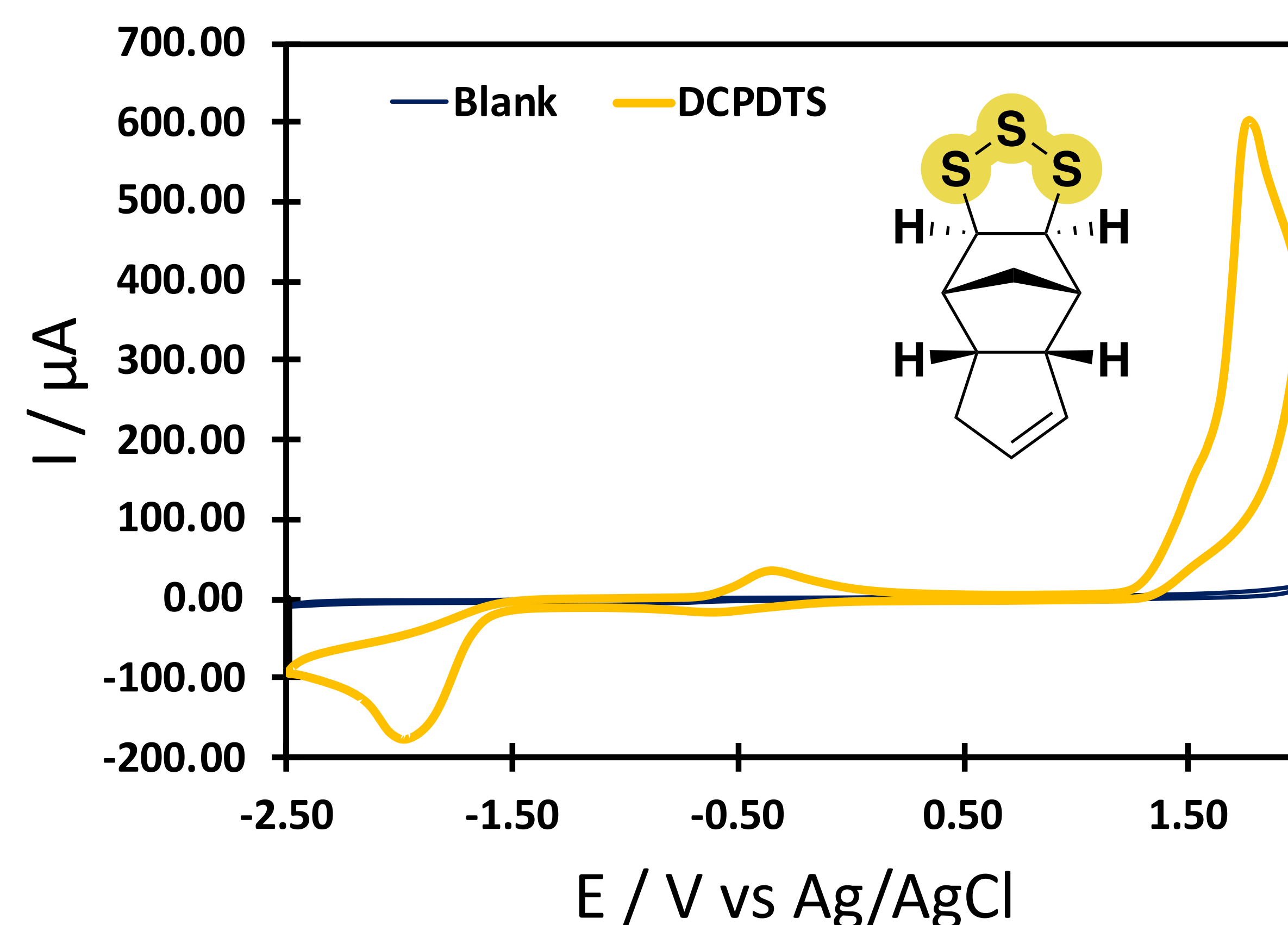
Cyclic sulfur monomer synthesis



Monomer crystal structures:

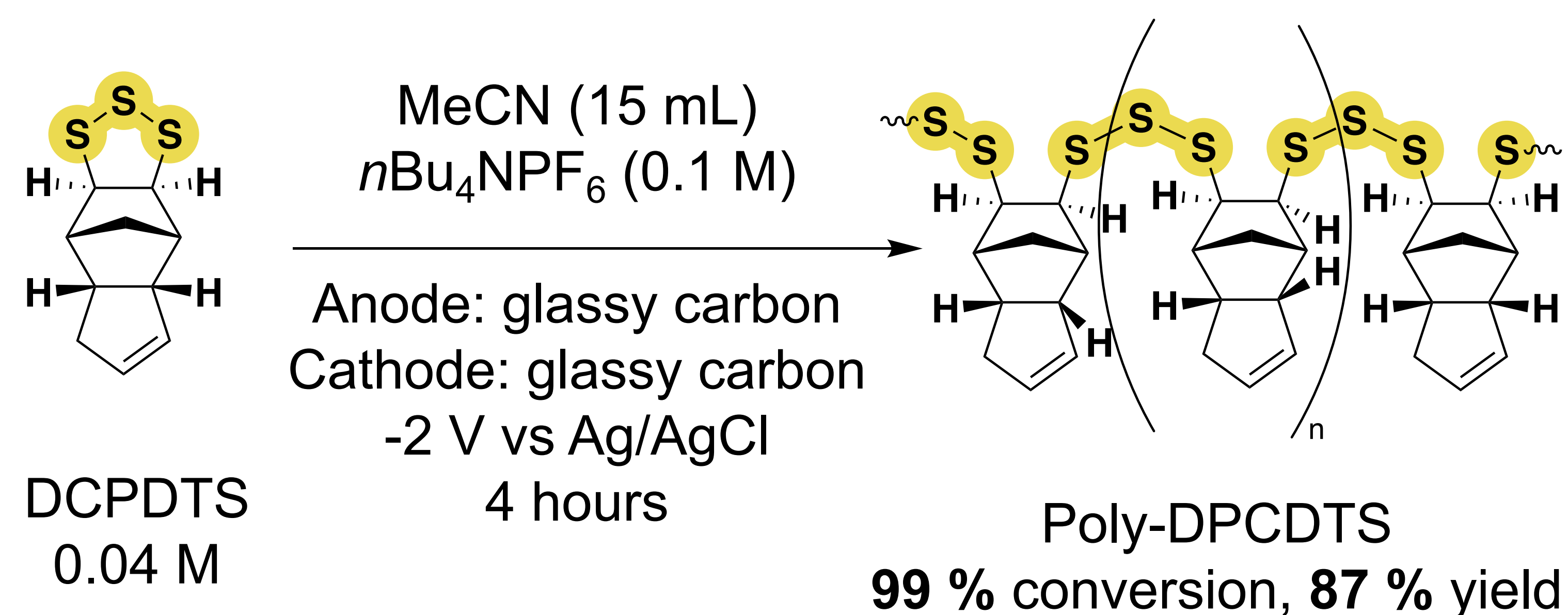


Cyclic voltammetry



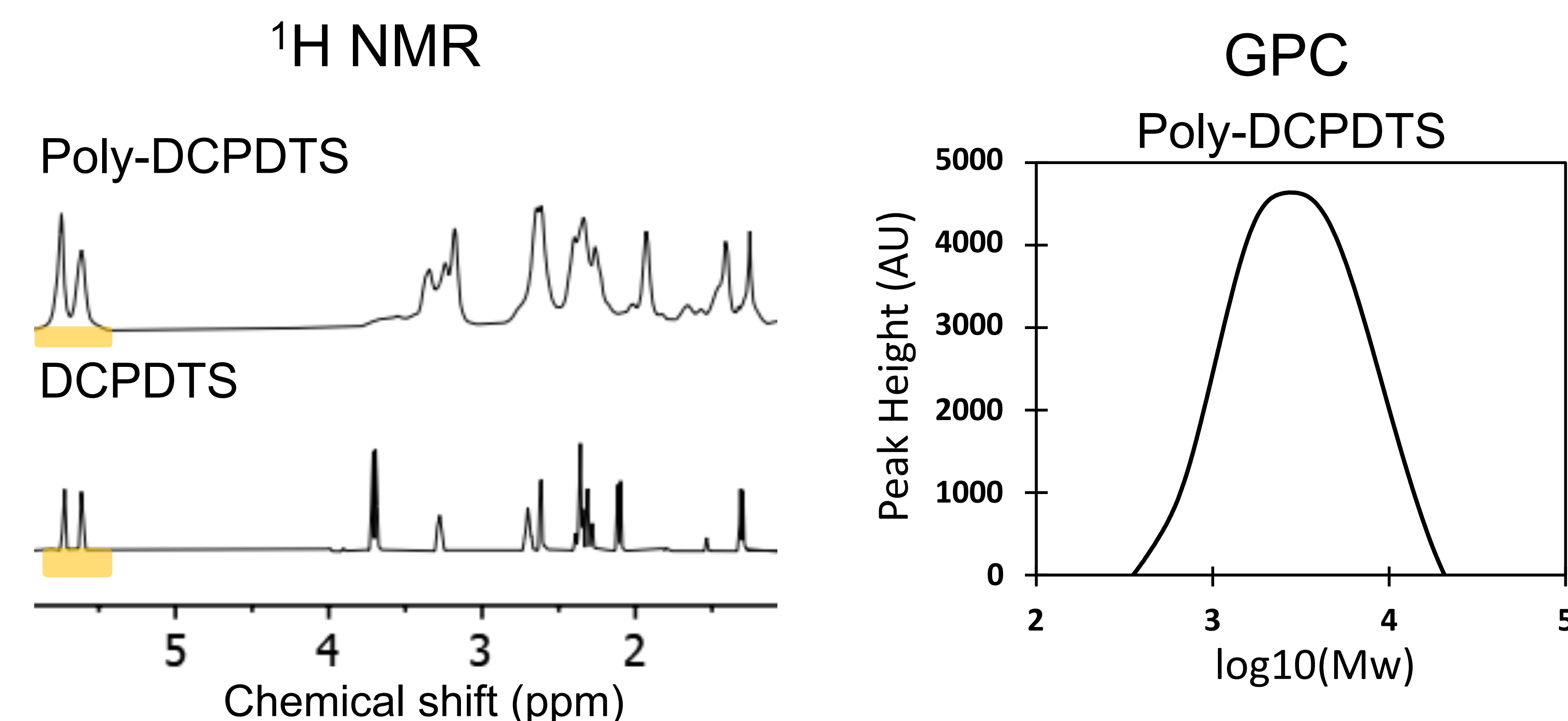
- Reduction potential: - 1.8 V
- Reduction potential consistent across all monomers

Electrochemical polymer synthesis



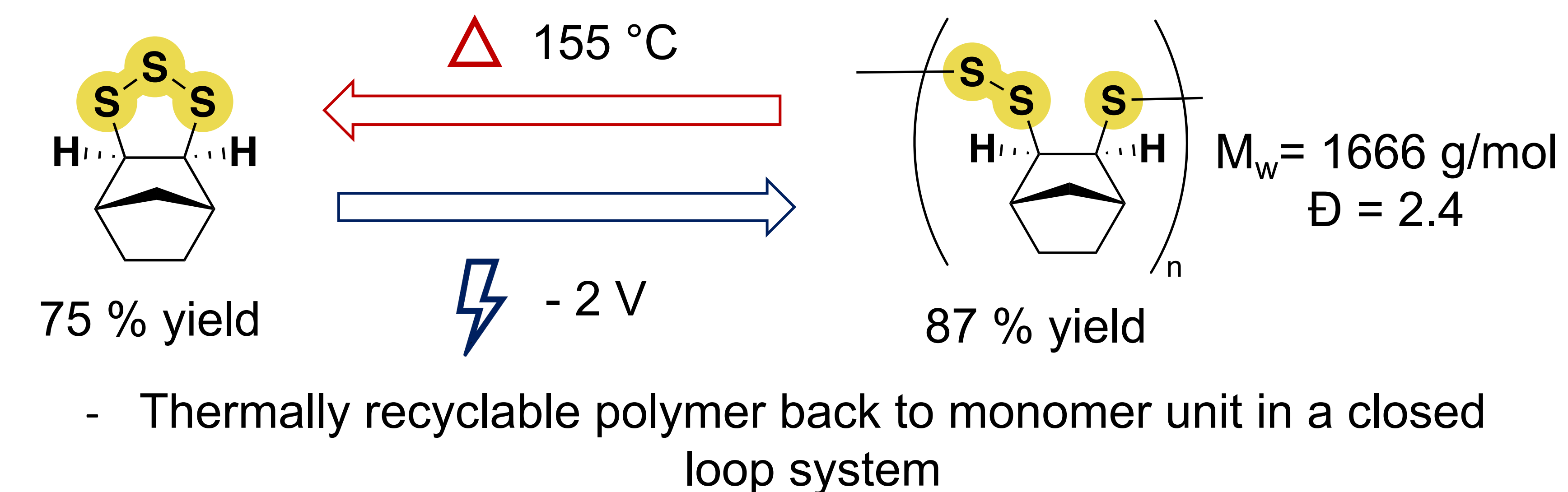
Atmospheric conditions - Linear polymer - Room temperature
Chemical initiator free

Polymer characterization



- Integration of alkene peaks is not affected by polymerization, indicating no crosslinking
- M_w = 4102 g/mol
- Đ = 1.8

Thermal recycling



References

- Poulain, Julien, and Duñach, **2005**. *Tetrahedron letters*, 46(41), pp.7077-7079.
- <https://www.chalkerlab.com>