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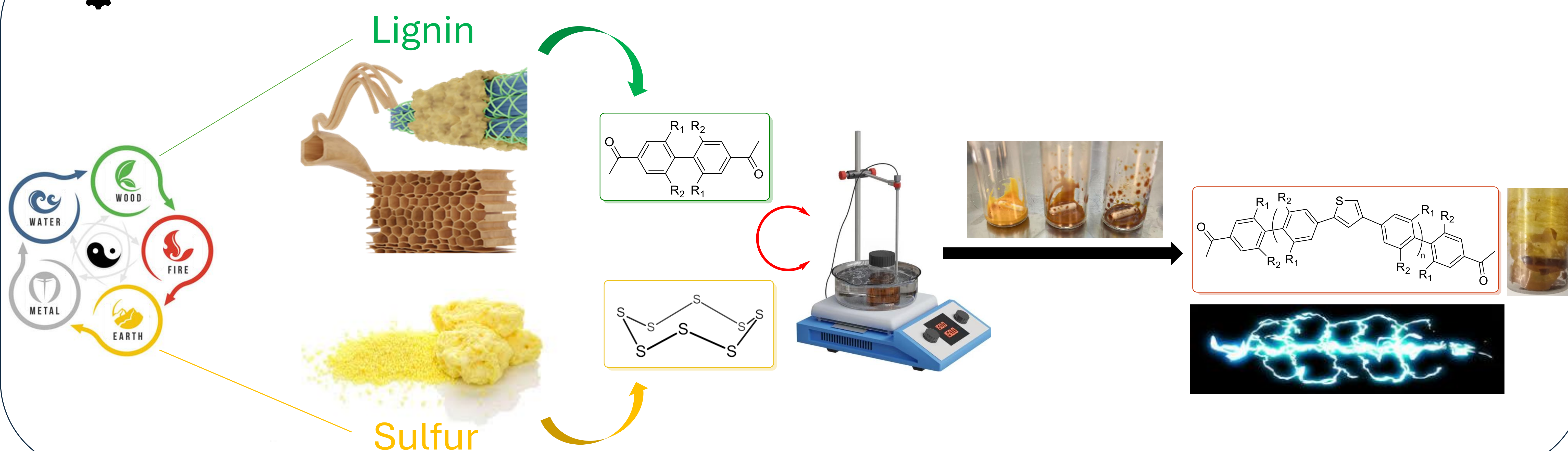
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- Lignin is a mixture of organic macromolecules from wood, which can provide plenty of small aromatic bio-based molecules through depolymerization. <sup>1</sup>
- Acetovanillone, an aromatic molecule that can be derived from lignin, have the potential to develop new molecules for because of its phenol, methoxy and ketone group.
- Combined ketones with sulfur, one can create thiophene group which is well-known for electrochemical properties. <sup>2</sup>
- Based on acetovanillone, we try to create dimer with 2 ketones on its two ends, then polymerize it by sulfurative self-condensation.

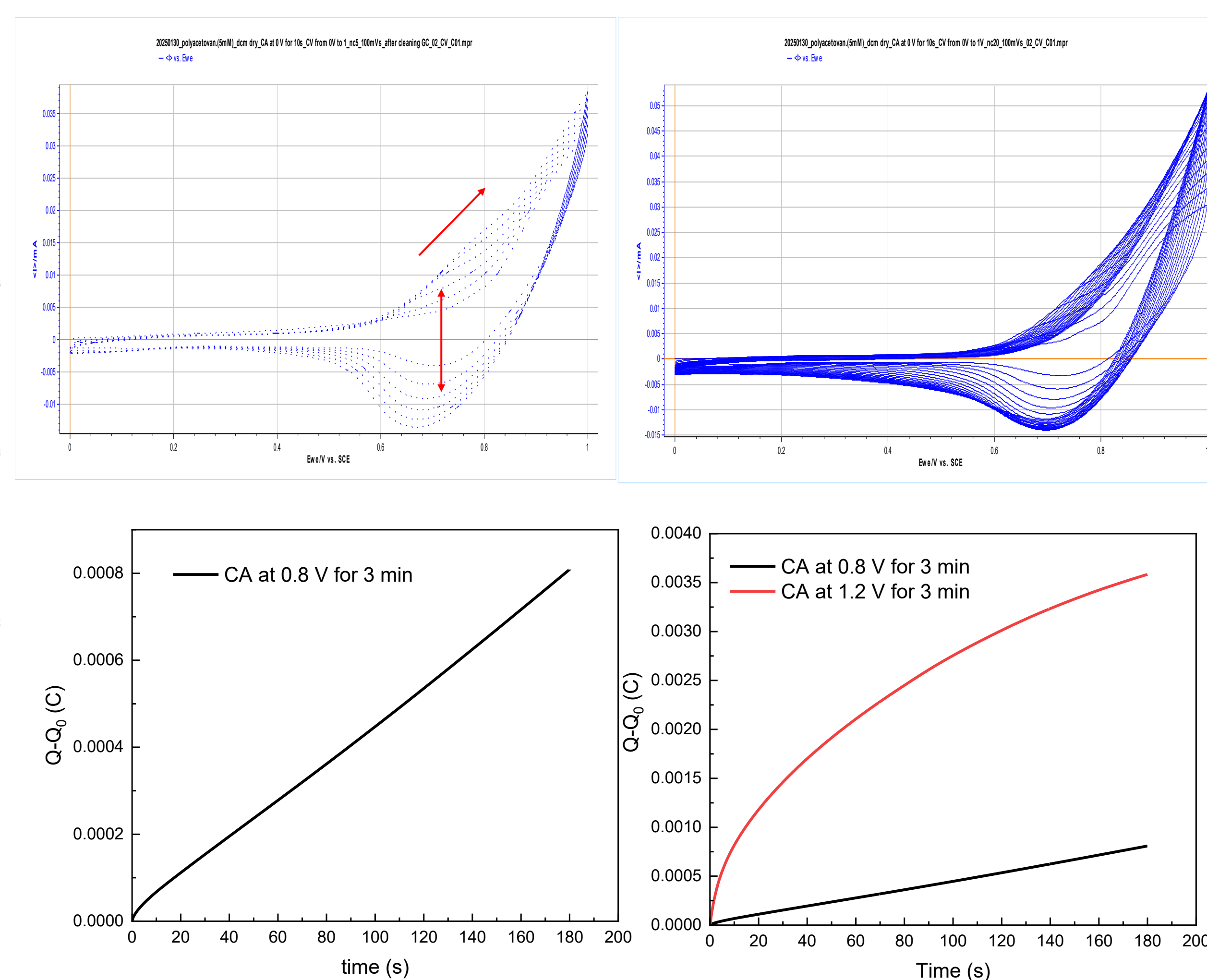
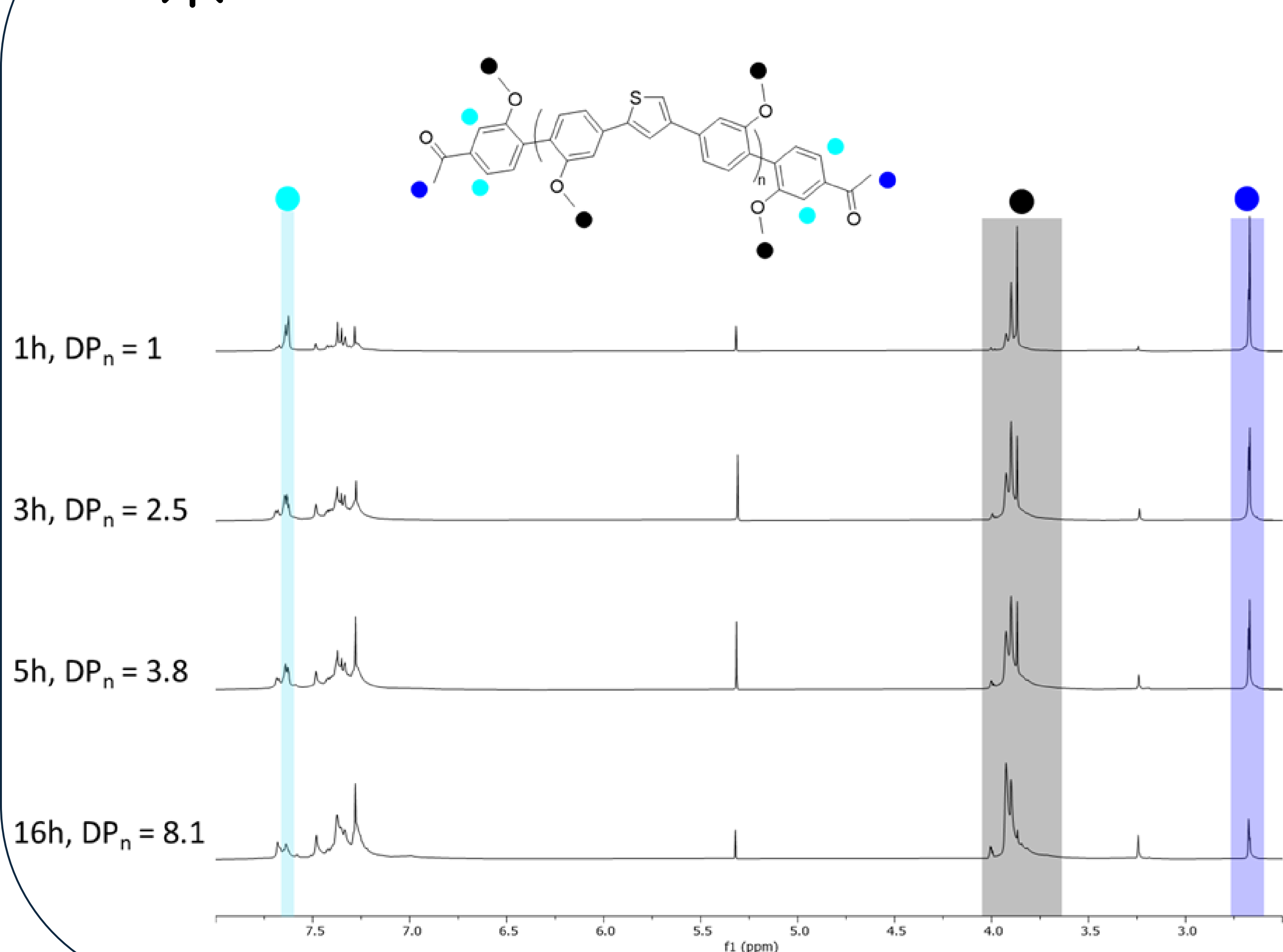


- Design and optimization a new synthetic pathway towards bio-sourced polymers.
- Further understanding of the polymerization and the chemical structure of the obtained polymers
- Detailed physical and chemical characterization of the polymers, especially for its electronic properties



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- Chemical reaction scheme showing the synthesis of a bis-phenol A derivative. The first step shows a substituted phenol with an acetyl group, a hydroxyl group, and substituents R<sub>1</sub> and R<sub>2</sub> reacting to form a sulfonate intermediate. The second step shows the sulfonate intermediate reacting to form a bis-phenol A derivative with two acetyl groups and two sets of R<sub>1</sub> and R<sub>2</sub> substituents.

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- Chemical reaction scheme showing the synthesis of a ladder polymer. Two equivalents of a substituted benzophenone (with  $R_1$  and  $R_2$  substituents) react with sulfur ( $S$ ) to form a ladder polymer. The polymer structure consists of repeating units linked by sulfur atoms, with the ladder backbone formed by the original benzophenone core and the sulfur bridge.



- Over the voltammetric cycles, the current is increasing, a shift is also observed

- The conductivity of polymer changed facing different electronic potential



1. Li, C *et al.*, Chem. Rev. **2015**, 115 (21), 11559–11624.
2. Kaloni, T *et al.*, Chem. Mater. **2017**, 29 (24), 10248–10283.
3. Percec, V *et al.*, J. Org. Chem., **1995**, 60, 176–185.
4. Nguyen, T *et al.*, Green Chem., **2018**, 20, 387–390.

