

**Title :** Development of Sustainable Organic Electrode Polymers via Azo Coupling Polymerization of 2,6-Diaminoanthraquinone and Biomass-Derived Phenolic Compounds for Energy Storage Applications

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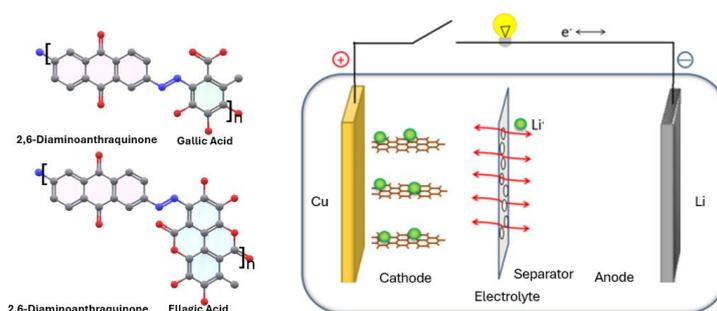
**Major :** Environmental Science

**Advisor(s) :** 1. Assistant Professor Dr. Natthawat Semakul

**Type of presentation\* (choose 1) :**  Oral Presentation (เฉพาะ ตัวแทนศ.ที่สาขาเลือกให้นำเสนอแบบบรรยาย)  
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 Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

## ABSTRACT

Lithium-ion batteries are widely used energy storage devices because of their lightweight and high energy capacity, but concerns remain regarding the limited availability of resources. As a more sustainable alternative, lithium-organic batteries have gained attention, with azo compounds recently identified as promising organic electrodes due to their ease of synthesis and reversible redox activity. Inspired by the excellent electrochemical performance of naturally occurring phenolic compounds, we explore the use of these compounds to synthesize organic polymers for lithium-organic batteries. In this work, an azo coupling polymerization between 2,6-diaminoanthraquinone with gallic acid and ellagic acid was studied. The synthesized polymers were characterized by several techniques, including FT-IR spectroscopy, solid-state NMR, and elemental analysis. Results indicate that AQ-ellagic acid polymers exhibit superior battery performance compared to AQ-gallic acid, which exhibits 582 mA h g<sup>-1</sup> for ellagic acid and 474 mA h g<sup>-1</sup> for gallic acid at 100 mA g<sup>-1</sup>. Additionally, a cost analysis and sustainability assessment based on the green chemistry principles of natural phenolic compounds as organic electrode materials will be discussed. This study highlights the potential of biomass-derived phenolic compounds as coupling monomers for sustainable organic electrode materials in eco-friendly lithium-organic batteries.



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