Special Issue

The Electrochemical Oxidation of Small Organic Molecules

Message from the Guest Editors

The electrochemical oxidation of small organic molecules (SOMs) occupies significant attention due to its capacity to generate energy and value-added chemicals. It serves as a crucial process for energy conversion, wastewater treatment, and organic electrosynthesis. The small organic molecules suitable for electrochemical oxidation are divided into various categories. For instance, one practical application of SOMs is in low-temperature fuel cells, where the energy generated from the oxidation of methanol, ethanol, or formic acid is directly transformed into electricity. The oxidation of alkanes, including methane, ethane, propane, and butane, represents the most widely used small organic molecules as feedstocks in high-temperature solid oxide fuel cells or solid oxide electrolytic cells. Another commonly used feedstock is biomass, with notable examples of biomass-derived chemicals such as furfural, 5-hydroxymethylfurfural, and glycerol, which serve as renewable alternatives to products derived from petroleum. Lastly, electrochemical oxidation processes employ electricity to degrade organic pollutants found in wastewater.

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Deadline for manuscript submissions

30 June 2026

Molecules

an Open Access Journal by MDPI

Impact Factor 4.6
CiteScore 8.6
Indexed in PubMed

mdpi.com/si/255445

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