**Record 1 of 1**

**Title:** Efficient Electrochemical-Enzymatic Conversion of PET to Formate Coupled with Nitrate Reduction Over Ru-Doped Co<sub>3</sub>O<sub>4</sub> Catalysts

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**Abstract:** Electrochemical reforming presents a sustainable route for the conversion of nitrate (NO3-) and polyethylene terephthalate (PET) into value-added chemicals, such as ammonia (NH3) and formic acid (HCOOH). However, its widespread application has been constrained by low selectivity due to the complexity of reduction processes and thus energy scaling limitations. In this study, the atomically dispersed Ru sites in Co3O4 synergistically interact with Co centers, facilitating the adsorption and activation of hydroxyl radicals (OH*) and ethylene glycol (EG), resulting in a remarkable HCOOH selectivity of 99% and a yield rate of 11.2 mmol h(-1) cm(-2) surpassing that of pristine Co3O4 (55% and 3.8 mmol h(-1) cm(-2)). Furthermore, when applied as a bifunctional cathode catalyst, Ru-Co3O4 achieves a remarkable Faradaic efficiency (FE) of 98.5% for NH3 production (3.54 mmol h(-1) cm(-2)) at -0.3 V versus RHE. Additionally, we developed a prototype device powered by a commercial silicon photovoltaic cell, enabling on-site solar-driven production of formate and NH3 through enzyme-catalyzed PET and NO3- conversion. This study offers a viable approach for waste valorization and green chemical production, paving the way for sustainable energy applications.

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