Doped Perovskites for Catalyzing Urea Oxidation

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Urea electrooxidation has the potential for both waste remediation of toxic nitrogen compounds and efficient generation of hydrogen for renewable energy production. This work explored the application of doped perovskites as catalysts for oxidizing urea. In particular, a target perovskite was synthesized with partial A-site strontium substitution to attain a higher oxidation in the B site, which was hypothesized to enhance mass activity, a measure of catalytic performance. For comparison, a control perovskite, which lacked A-site doping, was also prepared. The phase purity and crystalline structure of the perovskites were confirmed through X-ray diffraction, and their surface areas were determined by BET analysis. Their oxidation currents were measured by cyclic voltammetry, performed through multiple trials on several samples of the perovskites supported on Vulcan carbon in 1 M KOH solution with 0.33 M urea. The target perovskite was found to have a larger surface area and a larger mass activity than the control perovskite, thus supporting the initial hypothesis. Furthermore, the target perovskite compared favorably to common nickel based catalysts, indicating its promise as an effective catalyst for urea oxidation.

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