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Harnessing Electrical-to-Chemical Energy for Sustainable Conversion

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Deadline for manuscript submissions:
closed (31 December 2022)

Message from the Guest Editors

The conversion of clean electrical energy into chemical energy for the ease of storage is an ideal method for the development of sustainable energy resources, as well as the green and efficient synthesis of chemicals. Advanced electrocatalytic systems are at the core of high-efficiency electrical–chemical energy conversion, covering a wide range of scientific fields with magnitudes ranging from the atomic scale to the macroscale, including catalyst structure control, mechanisms of multiphase interface charge-transfer catalytic reactions, and the engineering design of electrocatalytic devices and equipment.

According to the current state of development in the field of electrocatalysis, significant breakthroughs are expected in the next five to ten years in both basic and applied research fields. The basic research fields include, but are not limited to: (1) innovative types of electrocatalytic reactions, (2) comprehensive molecular activation–transformation pathways, (3) in-depth analysis of rate-determining steps in catalytic reactions (chemical kinetics, charge transfer, and molecular mass transfer), and (4) novel structure design of electrocatalytic materials.

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Message from the Editor-in-Chief

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