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# Enhanced Hydrazine Oxidation on Histidine-Functionalized Graphene-Based Electrocatalysts

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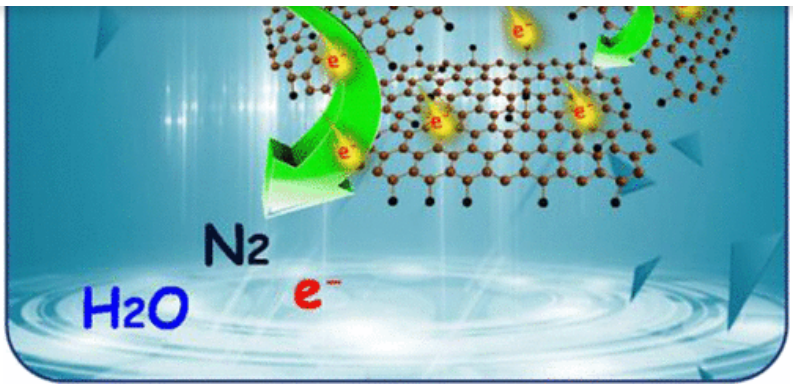
**SUBJECTS:** Electrocatalysts, Functionalization, Monomers, Two dimensional materials

## Abstract




One of the most essential processes in industrial and other potential energy applications is the electrochemical hydrazine oxidation reaction (HzOR). With an onset potential of 0.75 V versus reversible hydrogen electrode (RHE), the electrochemical HzOR performance of histidine-functionalized graphene oxide (Hist@rGO) is substantially enhanced with an achieved higher current of 24 mA/cm$^2$ at 1.95 V versus RHE in 0.5 M KOH. Hist@rGO has the highest electrocatalytic performance for hydrazine oxidation processes according to electrochemical measurements. Moreover, the Hist@rGO-supported material performs admirably that may be attributed to its synergistic catalytic activity. The presence of an imidazole ring containing heteroatoms on the top of GO boosts the electrocatalytic activity and electron-transfer capacities toward the HzOR, resulting in outstanding electrochemical HzOR performance for the Hist@rGO electrocatalyst. The size of Hist@rGO is confirmed by morphological studies using high-resolution transmission electron microscopy. From the binding energies of C–N, C–O, and C–C signals, X-ray photoelectron spectroscopy validates the surface modification of GO by histidine (Hist@rGO). According to our data, the metal-free amino acid-functionalized carbon-based electrocatalyst has an excellent electrochemical HzOR performance and plays an important role in activity.

- XRD patterns of GO and Hist@rGO; SEM of Hist@rGO; TEM of Hist@rGO; TEM of Hist@rGO after stability test; Raman spectra; FTIR of Hist@rGO; UV spectra of GO and Hist@rGO; XP spectra of Hist@rGO after stability test; CV curve of Hist@rGO; chart and linear dependent study of Hist@rGO; CV curves of Hist@rGO, GO, and rGO in $NH_2NH_2$ with 0.5 M KOH, and EF (PDF)

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