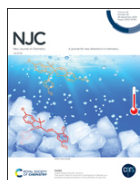


[Log in / register](#)

Issue 36, 2020

[Previous](#)[Next](#)

From the journal:

New Journal of Chemistry

Cobalt oxide nanoparticle-decorated reduced graphene oxide (Co₃O₄-rGO): active and sustainable nanoelectrodes for water oxidation reaction †

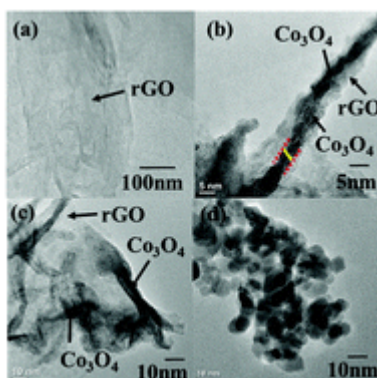
[Ajay V. Munde](#),^a [Balaji B. Mulik](#),^a [Raviraj P. Dighole](#)^a and [Bhaskar R. Sathe](#) ^{*a}

[Author affiliations](#)

Abstract

Herein, cobalt oxide (Co₃O₄)-decorated reduced graphene oxide (rGO)-based nanoelectrodes were fabricated by the chemical reduction method using hydrazine hydrate. It showed enhanced electrocatalytic activity for oxygen evolution (water oxidation) reactions (OER) in an alkaline medium. These as-synthesized materials were characterized by X-ray diffraction (XRD), Fourier transform-infrared (FT-IR) spectroscopy, energy dispersive analysis of X-ray (EDAX), Raman spectroscopy and transmission electron microscopy (TEM). The XRD studies confirmed that Co₃O₄ had a cubic spinal structure and morphological studies based on TEM analysis showed that Co₃O₄ existed with ~5 nm-thick chain-like nanostructures that decorated rGO. This Co₃O₄-modified reduced graphene oxide (Co₃O₄-rGO) electrocatalyst was found to be extraordinarily active towards oxygen evolution reactions (OER) and is one of the complex reactions of water splitting technique. This was further confirmed by an ultra-low onset potential of 1.38 V vs. RHE with a high current density of 10 mA mg⁻¹ of Co₃O₄ loading (calculated from TGA) at the constant potential of 1.50 V vs. RHE. The enhancement factor of Co₃O₄-rGO = 2000 was almost 3.25 times higher compared with that of Co₃O₄ = 600 under similar electrolytic conditions probably due to the synergetic co-operative interactions at modified interfaces. Chronoamperometric (*i-t*) and electrochemical impedance spectroscopic (EIS) measurements

demonstrated higher current/potential stability and lower charge transfer resistance, respectively, for Co₃O₄-rGO compared with those of rGO and Co₃O₄ towards the water oxidation reaction.

[About](#)[Cited by](#)[Related](#)

Buy this article

£42.50*

* Exclusive of taxes

This article contains 9 page(s)

Other ways to access this content

Log in

Using your institution credentials

Sign in

With your membership or subscriber account

Supplementary files

Supplementary information

PDF (641K)

Article information

<https://doi.org/10.1039/D0NJ02598D>

Article type

Paper

Submitted

23 May 2020

Accepted

14 Aug 2020

First published

19 Aug 2020

Citation*New J. Chem.*, 2020, **44**, 15776-15784

BibTex



Go

Permissions[Request permissions](#)**Social activity**

Tweet

Share

Search articles by author

- Ajay V. Munde
- Balaji B. Mulik
- Raviraj P. Dighole
- Bhaskar R. Sathe

Go

Spotlight

Advertisements

Journals, books & databases



- [Home](#)
- [About us](#)
- [Membership & professional community](#)
- [Campaigning & outreach](#)
- [Journals, books & databases](#)
- [Teaching & learning](#)
- [News & events](#)
- [Locations & contacts](#)
- [Careers](#)
- [Awards & funding](#)
- [Advertise](#)
- [Help & legal](#)
- [Privacy policy](#)
- [Terms & conditions](#)



© Royal Society of Chemistry 2024

Registered charity number: 207890