Electro-catalyst based on cerium doped cobalt oxide for oxygen evolution reaction in electrochemical water splitting

By: Khan, SA (Khan, Shahid Ali)[1,2] ; Khan, SB (Khan, Sher Bahadar)[1,2] ; Asiri, AM (Asiri, Abdullah M.)[1,2]

View ResearcherID and ORCID

JOURNAL OF MATERIALS SCIENCE-MATERIALS IN ELECTRONICS
Volume: 27 **Issue:** 5 **Pages:** 5294-5302
DOI: 10.1007/s10854-016-4427-3
Published: MAY 2016
View Journal Impact

Abstract

Several doped cobalt oxide nanomaterials such as cerium doped cobalt oxide-1, cerium doped cobalt oxide-2, titanium doped cobalt oxide and iron doped cobalt oxide were synthesized and their catalytic activities in electrochemical water splitting were checked for oxygen evolution reaction. The catalytic activity of doped cobalt oxide nanomaterials were observed in potassium hydroxide solution and among all synthesized nanomaterials, the strongest catalytic activity was displayed by cerium doped cobalt oxide-2 nanoparticle in water splitting. Cerium doped cobalt oxide-2 exhibit higher current density at lower over potential and lower Tafel slope as compared to all other studied cobalt based nanomaterials. At 1.0 V, cerium oxide doped cobalt oxide-2 supplied a current density of 39.2 mA/cm(2) in 0.3 M potassium hydroxide solution. Thus cerium doped cobalt oxide-2 exhibit superior electrocatalytic performance and therefore cerium doped cobalt oxide-2 is an attractive finding for superior oxygen evolution in water splitting.

Keywords

KeyWords Plus: SOLAR-ENERGY

Author Information

Reprint Address: Khan, SB (reprint author)

– King Abdulaziz Univ, CEAMR, POB 80203, Jeddah 21589, Saudi Arabia.
Organization-Enhanced Name(s)
King Abdulaziz University

Reprint Address: Khan, SB (reprint author)

– King Abdulaziz Univ, Dept Chem, Fac Sci, POB 80203, Jeddah 21589, Saudi Arabia.
Organization-Enhanced Name(s)
King Abdulaziz University

Addresses:

– [1] King Abdulaziz Univ, CEAMR, POB 80203, Jeddah 21589, Saudi Arabia
Organization-Enhanced Name(s)
King Abdulaziz University

– [2] King Abdulaziz Univ, Dept Chem, Fac Sci, POB 80203, Jeddah 21589, Saudi Arabia
Organization-Enhanced Name(s)
King Abdulaziz University

E-mail Addresses: drkhanmarwat@gmail.com

Citation Network

Funding

Funding Agency	Grant Number
Center of Excellence for Advanced Materials Research (CEAMR), King Abdulaziz University, Jeddah	CEAMR-SG-3-437

View funding text

Publisher

SPRINGER, VAN GODEWIJCKSTRAAT 30, 3311 GZ DORDRECHT, NETHERLANDS

Categories / Classification

Research Areas: Engineering; Materials Science; Physics

Web of Science Categories: Engineering, Electrical & Electronic; Materials Science, Multidisciplinary; Physics, Applied; Physics, Condensed Matter

Document Information

Document Type: Article

Language: English

Accession Number: WOS:000373742500148

ISSN: 0957-4522

eISSN: 1573-482X

Journal Information

Table of Contents: Current Contents Connect
Impact Factor: Journal Citation Reports

Other Information

IDS Number: DI8HQ

Cited References in Web of Science Core Collection: 31

Times Cited in Web of Science Core Collection: 7