

**MRS** **Advances**

# Energy and Sustainability

<https://doi.org/10.1557/adv.2018.379> Published online by Cambridge University Press

# MRS Advances: Energy and Sustainability

## Associate Editors:

Elizabeth L. Fleischer, *Materials Research Society*

Marian Kennedy, *Clemson University*

## Principal Editors:

Rita Toth, *Swiss Federal Laboratories for Materials Science and Technology (EMPA), Switzerland*

Lan Fu, *The Australian National University, Australia*

Cengiz Ozkan, *University of California, Riverside, USA*

Haleh Ardebili, *University of Houston, USA*

Yan Wang, *Worcester Polytechnic Institute, USA*

Smagul Karazhanov, *Institute for Energy Technology (IFE), Norway*

Philip Edmondson, *Oak Ridge National Laboratory, USA*

Amy Marconnet, *Purdue University, USA*

Jonathan Cullen, *University of Cambridge, UK*

Noritaka Usami, *Nagoya University, Japan*

## MRS Advances Editorial Board:

**Editor-in-Chief:** David F. Bahr, *Purdue University*

Asa Barber, *University of Portsmouth, United Kingdom*

Meenakshi Dutt, *Rutgers University*

Elizabeth L. Fleischer, *Materials Research Society*

Marian Kennedy, *Clemson University*

Marilyn L. Minus, *Northeastern University*

Roger J. Narayan, *University of North Carolina/North Carolina State University*

Ruth Schwaiger, *Karlsruhe Institute of Technology, Germany*

Jeremy Theil, *Mountain View Energy*

## Materials Research Society Editorial Office, Warrendale, PA:

Ellen W. Kracht, *Publications Manager*

Susan Dittrich, *Journals Editorial Assistant*

Kirby L. Morris, *Journals Production Assistant*

Eileen M. Kiley, *Director of Communications*

## Disclaimer

Authors of each article appearing in this Journal are solely responsible for all contents in their article(s) including accuracy of the facts, statements, and citing resources. Facts and opinions are solely the personal statements of the respective authors and do not necessarily represent the views of the editors, the Materials Research Society, or Cambridge University Press.

*MRS Advances* (EISSN: 2059-8521) is published by Cambridge University Press, One Liberty Plaza, Floor 20, New York, NY 10006 for the Materials Research Society.

**Copyright © 2018, Materials Research Society.** All rights reserved. No part of this publication may be reproduced, in any form or by any means, electronic, photocopying, or otherwise, without permission in writing from Cambridge University Press. Policies, request forms and contacts are available at: <http://www.cambridge.org/rights/permissions/permission.htm>. Permission to copy (for users in the USA) is available from Copyright Clearance Center at: <http://www.copyright.com>, email: [info@copyright.com](mailto:info@copyright.com).

## Purchasing Options:

**Premium Subscription-** Premium Subscription includes current subscription and one year's lease access to the full MRS Online Proceedings Library Archive for \$7,219.00 / £4,888.00 / €6,647.00. **Subscription-** Subscription with perpetual access to the content subscribed to in a given year, including three years of back-file lease access to content from the MRS Online Proceedings Library Archive. The price for a 2018 subscription is \$3,019.00 / £1,948.00 / €2,625.00. **MRS Members-** Access to *MRS Advances* is available to all MRS members without charge.

## Contact Details:

For all inquiries about pricing and access to *MRS Advances*, please get in touch via the following email addresses: [online@cambridge.org](mailto:online@cambridge.org) (for the Americas); [library.sales@cambridge.org](mailto:library.sales@cambridge.org) (for UK, Europe, and rest of world).

[cambridge.org/adv](http://cambridge.org/adv)

# CONTENTS

<b>Theoretical Pulse Charge for the Optimal Inhibition of Growing Dendrites. . . . .</b>	<b>1201</b>
Asghar Aryanfar, Daniel J. Brooks, and William A. Goddard III	
<b>Sodium Metal Sulphate Alluaudite Class of High Voltage Battery Insertion Materials . . . . .</b>	<b>1209</b>
Debasmita Dwibedi and Prabeer Barpanda	
<b>Electrocatalytic Activity of Some Cobalt Based Sodium Phosphates in Alkaline Solution . . . . .</b>	<b>1215</b>
Debasmita Dwibedi, Ritambhara Gond, Krishnakanth Sada, Baskar Senthilkumar, and Prabeer Barpanda	
<b>Interfacial Electron Transfer Involving Vanadium and Graphene Quantum Dots for Redox Flow Battery . . . . .</b>	<b>1221</b>
L. Robarts and K.S.V. Santhanam	
<b>Large-Scale DFT Simulation of Li-atom Insertion and Extraction in Quinons@SWCNT Rechargeable Battery Cathodes . . . . .</b>	<b>1229</b>
Takahiro Tsuzuki, Shuji Ogata, and Masayuki Uranagase	
<b>Characterization of Catalytic Conducting Polymer Electrodes in Biofuel Devices . . . . .</b>	<b>1235</b>
Keiichi Kaneto, Mao Nishikawa, and Sadahito Uto	
<b>High-rate Performance of LiCoO<sub>2</sub> Epitaxial Thin Films with Various Surface Conditions . . . . .</b>	<b>1243</b>
Sou Yasuhara, Shintaro Yasui, Tomoyasu Taniyama, and Mitsuru Itoh	
<b>Lithium Titanate Confined in Nanoporous Copper for High-rate Battery Applications . . . . .</b>	<b>1249</b>
Xiaobo Zhang, Kostiantyn Turcheniuk, Jim Benson, Benjamin Zusmann, Wenbin Fu, Enbo Zhao, Alexandre Magasinski, and Gleb Yushin	

**Electrochemically Induced Phase Evolution of Lithium Vanadium Oxide: Complementary Insights Gained via *Ex-Situ*, *In-Situ*, and *Operando* Experiments and Density Functional Theory . . . . . 1255**  
 Jiefu Yin, Wenzao Li, Mikaela Dunkin,  
 Esther S. Takeuchi, Kenneth J. Takeuchi,  
 and Amy C. Marschilok

**Gel Electrolyte Based Supercapacitors with Higher Capacitances and Lower Resistances than Devices with a Liquid Electrolyte . . . . . 1261**  
 Belqasem Aljafari and Arash Takshi

**Material Design Strategies to Achieve Simultaneous High Power and High Energy Density. . . . . 1269**  
 Qiyuan Wu, Calvin D. Quilty,  
 Kenneth J. Takeuchi, Esther S. Takeuchi,  
 and Amy C. Marschilok