

---

# Materials for Low Temperature Electrochemical Systems

## 8

---

Editors:

M. Shao

G. Wu

Sponsoring Division:



Published by

The Electrochemical Society  
65 South Main Street, Building D  
Pennington, NJ 08534-2839, USA  
tel 609 737 1902  
fax 609 737 2743  
[www.electrochem.org](http://www.electrochem.org)

**acs**transactions™

Vol. 108, No. 7

---

Copyright 2022 by The Electrochemical Society.  
All rights reserved.

This book has been registered with Copyright Clearance Center.  
For further information, please contact the Copyright Clearance Center,  
Salem, Massachusetts.

Published by:

The Electrochemical Society  
65 South Main Street  
Pennington, New Jersey 08534-2839, USA

Telephone 609.737.1902  
Fax 609.737.2743  
e-mail: [ecs@electrochem.org](mailto:ecs@electrochem.org)  
Web: [www.electrochem.org](http://www.electrochem.org)

ISSN 1938-5862 (online)

ISBN 978-1-60768-948-5 (PDF)

Printed in the United States of America.

---

**ECS Transactions, Volume 108, Issue 7**  
Materials for Low Temperature Electrochemical Systems 8

**Table of Contents**

Preface	iii
Operating Proton Exchange Membrane Fuel Cells at a Constant Relative Humidity <i>N. M. Bielefeld, R. D. Sorensen, M. Jorgensen, K. S. Kure, T. Berning</i>	3
Hybrid Electrocatalysts Composed of PtSn, Ru or PtRu Nanoparticles for Low-Temperature Oxidation of Dimethyl Ether Fuel <i>B. Rytelewska, I. A. Rutkowska, P. J. Kulesza</i>	17
Bifunctional Platinum-Free Mixed Metal Oxygen Electrocatalysts Based on Naturally Abundant Peat <i>P. Teppor, R. Jager, M. Harmas, J. Aruvali, O. Volobujeva, M. Koppel, E. Lust</i>	29
(Digital) Oxygen Reduction Reaction on Waste Tire Derived Carbon Material and Synthesized Non-Platinum Group Metal Catalysts in Alkaline Solution <i>J. Laanemae, R. Jager, P. Teppor, O. Volobujeva, E. Lust</i>	39
Investigation of Oxygen Reduction on Platinum Nanoparticles Deposited Onto Peat-Derived Carbon Carrier <i>W. Lobjakas, J. Nerut, H. Kasuk, A. Adamson, T. Thomberg, J. Aruvali, P. Valk, P. Teppor, M. Koppel, V. Mikli, O. Volobujeva, E. Lust</i>	49
Nanostructured Pt-Ru Catalyst Supported on Si-Containing Ordered Mesoporous Carbon Hollow Spheres for the Ethanol Oxidation Reaction <i>J. H. Serna-Mata, J. A. Diaz-Guillen, F. J. Rodriguez-Varela, J. C. Carrillo-Rodriguez, I. L. Alonso-Lemus, M. A. Garcia-Lobato</i>	59
Electrospun N-S-Codoped Carbon Nanofibers As Metal-Free Electrocatalysts With Catalytic Activity For The Oxygen Reduction Reaction In Alkaline Media <i>C. Parga-Marrufo, I. L. Alonso-Lemus, A. Diaz-Guillen, B. Escobar-Morales, J. Escoria-Garcia</i>	69

<i>(Digital Presentation) Carbon Aerogel Platinum-Praseodymium Oxide Nanocatalyst for Methanol Oxidation in 0.5 M Sulfuric Acid</i>	79
<i>A. V. Prits, J. Nerut, H. Kasuk, M. Koel, S. Sepp, P. Valk, J. Aruvali, M. Koppel, V. Mikli, O. Volobujeva, E. Lust</i>	
<i>Fe-N-C Self-Doped Sewage Sludge-Derived Biocarbon With Catalytic Activity For The Oxygen Reduction Reaction</i>	91
<i>I. L. Alonso-Lemus, B. Escobar-Morales, F. Fernandez-Luqueno, P. Quintana-Owen, L. delaTorre-Saenz, F. J. Rodriguez-Varela</i>	
<i>Characterisation of Novel Nitrogen Doped Reduced Graphene Oxide</i>	99
<i>J. Nerut, P. Teppor, R. Palm, R. Jager, T. Thomberg, K. Tuul, M. Koppel, J. Aruvali, A. Kikas, J. Mondal, V. Iakimov, E. Lust</i>	
<i>(Digital Presentation) Temperature-Dependent Study for Electrochemical Surface Area on a Catalyst Layer Used in a PEFC</i>	111
<i>R. Espinoza, K. Munoz, J. Santana, M. Espinoza Andaluz, M. Andersson</i>	
<i>A Feasibility Study of Placing a Heated Turbulence Grid in Front of an Air-Cooled Fuel Cell Stack in Freezing Conditions</i>	119
<i>D. Martinho, J. Hansen, C. Yin, T. Berning</i>	
<i>(Digital Presentation) A Corrosion Behavior of Aluminum-Carbon Composite Bipolar Plates in Polymer Electrolyte Membrane Fuel Cells</i>	131
<i>A. Jahan, M. A. Alam, S. Yonezawa, E. Suzuki, H. Yashiro</i>	
<i>Proton Exchange Membrane Fuel Cell Flow Field Configuration: Modelling and Experimental Verification</i>	143
<i>I. Tolj, Z. Penga, P. Bosnic, G. Radica</i>	
<i>3D Printed Carbon Aerogels for Polymer-Electrolyte Fuel Cells</i>	153
<i>A. D. Santamaria, S. Chandrasekaran, O. Philbrick, M. A. Worsley</i>	
<i>(Digital Presentation) Effects of Catalyst Dimension Parameters on Local Oxygen Transport in Cathode Catalyst Layer of Proton Exchange Membrane Fuel Cell</i>	165
<i>X. Li, F. Tang, B. Li, H. Dai, G. Chang, P. Ming</i>	
<i>(Digital Presentation) Effects of Foreign Elements Added Oxide-Based Electrocatalyst for Oxygen Reduction Reaction as Non-Precious Metal Cathodes</i>	181
<i>K. Matsuzawa, M. Obata, Y. Takeuchi, Y. Ohgi, K. Ikegami, T. Nagai, R. Monden, A. Ishihara</i>	

