Evaluation of SAGE Electrochromic Devices

Cooperative Research and Development Final Report

CRADA Number: CRD-15-579

NREL Technical Contact: Robert Tenent
NOTICE

This report was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.

This report is available at no cost from the National Renewable Energy Laboratory (NREL) at www.nrel.gov/publications.

Available electronically at SciTech Connect http://www.osti.gov/scitech

Available for a processing fee to U.S. Department of Energy and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
OSTI http://www.osti.gov
Phone: 865.576.8401
Fax: 865.576.5728
Email: reports@osti.gov

Available for sale to the public, in paper, from:

U.S. Department of Commerce
National Technical Information Service
5301 Shawnee Road
Alexandria, VA 22312
NTIS http://www.ntis.gov
Phone: 800.553.6847 or 703.605.6000
Fax: 703.605.6900
Email: orders@ntis.gov

Cover Photos by Dennis Schroeder: (left to right) NREL 26173, NREL 18302, NREL 19758, NREL 29642, NREL 19795.

NREL prints on paper that contains recycled content.
Cooperative Research and Development Final Report

In accordance with Requirements set forth in Article X: REPORTS AND PUBLICATIONS A.(2), of the CRADA agreement, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the DOE Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

Parties to the Agreement: SAGE Electrochromics Inc.

CRADA number: CRD-15-579

CRADA Title: Evaluation of SAGE Electrochromic Devices

Joint Work Statement Funding Table showing DOE commitment:

<table>
<thead>
<tr>
<th>Estimated Costs</th>
<th>NREL Shared Resources a/k/a Government In-Kind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>$ 87,000.00</td>
</tr>
<tr>
<td>TOTALS</td>
<td>$ 87,000.00</td>
</tr>
</tbody>
</table>

Abstract of CRADA Work:

NREL will conduct durability testing of Sage Electrochromics dynamic windows products using American Society for Testing and Materials (ASTM) standard methods and drive parameters as defined by Sage. Window units will be tested and standard analysis performed. Data will be summarized and reported back to Sage at the end of the testing period.

Summary of Research Results:

The National Renewable Energy Laboratory (NREL) performed an evaluation of eight (8), 12” x 12” SAGE Electrochromic test samples. The evaluation of four (4) of the submitted samples was performed in accordance with the most current released version of ASTM E2141 Standard Test Method for Accelerated Aging of Electrochromic Devices in Sealed Insulating Glass Units. These four (4) samples were evaluated in accordance with ASTM 2141 Standard Specification for Evaluating the Accelerated Aging Performance of Electrochromic Devices in Sealed Insulating Glass Units.

The weathering of 4 samples was conducted as outlined in the current version of the ASTM E2141 test method employing a cycling algorithm, which has been defined by SAGE Electrochromics and required a deeper cycle than is currently required by the current revision of test method ASTM 2141. These samples were evaluated using methods described in ASTM 2141 Standard Specification for Evaluating the Accelerated Aging Performance of
Electrochromic Devices in Sealed Insulating Glass Units with a view to gathering data to support discussion on possible changes and will be judged against the requirements of EXXXX.

**TASKS**

1.1 NREL received a total of ten (10), 12” x 12” samples of SAGE Electrochromic sealed insulating glass units.

1.2 Pre-weatherization evaluation of the SAGE samples did not begin until a representative of SAGE Electrochromics was present to witness the initial evaluation of the samples and the initiation of the weathering testing.

1.3 Weatherization of the SAGE samples was completed by NREL in compliance with the conditions defined in ASTM 2141.

1.4 Post weatherization evaluation of the SAGE samples did not begin until a representative of SAGE Electrochromics was present to witness the evaluation.

**Subject Inventions Listing:**

N/A

**ROI #:**

N/A

**Report Date:**

30 November 2017

**Responsible Technical Contact at Alliance/NREL:**

Robert Tenent

**Name and Email Address of POC at Company:**

Helen Sanders, helen.sanders@sageglass.com

**DOE Program Office:**

Buildings Technologies Office

   This document contains NO confidential, protectable, or proprietary information.