



AIST-NREL Concentrator Photovoltaic (CPV) Demonstration

**Cooperative Research and
Development Final Report**

CRADA Number: CRD-10-402

NREL Technical Contact: Sarah Kurtz

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Cooperative Research and Development Final Report

In accordance with Requirements set forth in Article XI, A(3) of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the 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: National Institute of Advanced Industrial Science and Technology (AIST)

CRADA Number: CRD-10-402

CRADA Title: AIST-NREL Concentrator Photovoltaic (CPV) Demonstration

Joint Work Statement Funding Table Showing DOE Commitment:

Estimated Costs	NREL Shared Resources
Year 1	\$ 50,000.00
Year 2	\$ 50,000.00
Year 3	\$ 100,000.00
TOTALS	\$ 200,000.00

Abstract of CRADA Work:

The purpose of the project is to demonstrate and quantitatively compare performance of CPV systems installed in Japan and in the United States. The deployment conditions (e.g. spectrum and temperature) are site dependent and the optimal design of the system may vary with location. The CPV systems will use multi-junction concentrator cells for the conversion of sunlight into electricity. The optimal design of the cell may depend on the location at which a CPV system is installed. Thus, the systems in Japan and in the U.S. will all use a combination of concentrator cells obtained from three different vendors. This CRADA pertains only to the equipment that will be installed in the U.S. This effort is a collaborative project between AIST and NREL.

Summary of Research Results:

CPV systems were deployed in Japan and in the United States. The CPV systems were manufactured by Daido Steel and installed by AIST. These used multi-junction concentrator cells made by three companies: Spectrolab (in the U.S.), Sharp (Japan), and Azur (Europe). The cells had slightly different efficiencies and were designed for slightly different spectra. However, comparisons of the relative performance for the three cell types showed that the differences in performance were more dominated by alignment issues than by differences between the cells. Although the instantaneous performance varied more, the energy yield as a function of air mass and spectral conditions was difficult to differentiate.

Results of this work have been published in the following:

Hashimoto, J. Y. Xue, K. Otani, M. Muller, and S. Kurtz “Performance of Grid-connected Conventional Flat-plate and Concentrator Photovoltaic Systems in Japan” ICEE 2014.

Kurtz, Sarah R., Matthew Muller, Dirk Jordan, Kanchan Ghosal, Brent Fisher, Pierre Verlinden, Jun Hashimoto, Daniel Riley. “Key Parameters in Determining Energy Generated by CPV Modules,” *Progress in PV*, DOI: 10.1002/pip.2544.

Hashimoto, J., Kurtz, S., Sakurai, K., Muller, M., & Otani, K. (2013). *Field experience and performance of CPV system in different climates*. Paper presented at the 9TH INTERNATIONAL CONFERENCE ON CONCENTRATOR PHOTOVOLTAIC SYSTEMS: CPV-9.

Hashimoto, Jun, Sarah Kurtz, Keiichiro Sakurai, Matthew Muller, Kenji Otani. “Performance of CPV system using three types of III-V multi-junction solar cells, CPV 8, 2014.

Subject Inventions Listing:

Not applicable.

Report Date:

Friday, May 1, 2015

Responsible Technical Contact at Alliance/NREL:

Sarah Kurtz

Name and email address of POC at company:

Jun Hashimoto, j.hashimoto@aist.go.jp

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