

founded in 1931

GORDON RESEARCH CONFERENCES *frontiers of science*

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Nancy Ryan Gray, Ph.D.
Director

**2013 GORDON RESEARCH CONFERENCE
on CHEMICAL REACTIONS AT SURFACES**

FINAL PROGRESS REPORT

DEPARTMENT OF ENERGY
GRANT NO. DE-SC0009388

The Gordon Research Conference on CHEMICAL REACTIONS AT SURFACES was held at Les Diablerets Conference Center, Les Diablerets, Switzerland, April 28-May3, 2013. The Conference was well-attended with 121 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 121 attendees, 44 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 44 respondents, 16% were Minorities –0% Hispanic, 16% Asian and 0% African American. Approximately 26% of the participants at the 2013 meeting were women.

In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled. Attached is a copy of the formal schedule and speaker program and the poster program. In addition to these formal interactions, "free time" was scheduled to allow informal discussions. Such discussions are fostering new collaborations and joint efforts in the field.

Thank you for your support of this Conference. As you know, in the interest of promoting the presentation of unpublished and frontier-breaking research, Gordon Research Conferences does not permit publication of meeting proceedings. If you wish any further details, please feel free to contact me. Thank you.

Sincerely,
Peter Stair, Conference Chairperson
NORTHWESTERN UNIVERSITY

Chemical Reactions at Surfaces
Surfaces in Energy and the Environment
April 28 - May 3, 2013
Les Diablerets Conference Center
Les Diablerets, Switzerland

Chair:

Peter C. Stair

Vice Chair:

Hans-Peter Steinruck

Related Meeting Information

The Chemical Reactions at Surfaces Gordon Research Conference was held in conjunction with the **Chemical Reactions at Surfaces Gordon Research Seminar**. Please refer to the Chemical Reactions at Surfaces GRS web page for more information.

The understanding and control of chemical reactions at interfaces (solid/gas, liquid/gas, and solid/liquid) are central to many modern technologies and environmental phenomena. The role of surface chemistry in the conversion of energy from one form to another, the efficient utilization of natural resources, and the understanding and mitigating of environmental impacts has never been more important. The Gordon Research Conference on Chemical Reactions at Surfaces is dedicated to promoting and advancing the fundamental science of interfacial chemistry and physics by providing a premier venue for presentation and discussion of research at the frontiers of the field. The 2013 conference will be located in Switzerland in order to encourage greater participation by the European surface science community. The conference will continue the tradition of fostering an engaging and open atmosphere of presentations, discussion, and learning for the benefit of attendees at all career stages (student to leader). Invited speakers will provide stimulating presentations on chemistry at solid and liquid surfaces of relevance to catalysis, synthesis, photochemistry, environmental science, and tribology. Poster sessions will offer the opportunity for student, postdoc, early career, and senior researchers to exchange and explore ideas on all aspects of surface chemistry. In the spirit of the Gordon Research Conferences, ample time will be available for afternoon recreation, relaxation and relationship building.

Contributors



**SUNDAY**

4:00 pm - 8:00 pm	Arrival and Check-in
6:00 pm	Dinner
7:30 pm - 7:40 pm	Welcome / Introductory Comments by GRC Site Staff and the Chair: Peter C. Stair (Northwestern University)
7:40 pm - 9:30 pm	Fundamental Surface Chemistry Discussion Leader: Hajo Freund (Fritz-Haber-Institute)
7:40 pm - 8:20 pm	Charlie Campbell (University of Washington) "Insights into Surface Reactivity, Reaction Mechanisms, Catalyst Stability and the Accuracy of DFT through Calorimetric Measurements"
8:20 pm - 8:35 pm	Discussion
8:35 pm - 9:15 pm	Ib Chorkendorff (Technical University of Denmark) "Correlation of reactivity and activity for single crystals and mass selected nanoparticles"
9:15 pm - 9:30 pm	Discussion

MONDAY

7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	Catalysis Discussion Leader: Fritz Solymosi (University of Szeged)
9:00 am - 9:40 am	Ras Raval (University of Liverpool) "Chirality at Surfaces: From Organized Molecular Patterns to the Emergence of Complexity"
9:40 am - 10:00 am	Discussion
10:00 am	Coffee Break
10:30 am - 11:10 am	Gianfranco Pacchioni (University of Milano Bicocca) "Atoms, Clusters and Nanoparticles on Oxide Surfaces and Ultrathin Films: Tuning Structure and Charge State"
11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	Peng Chen (Cornell University)

	"Single-Molecule Super-Resolution Imaging of Single Nanoparticle Catalysis"
12:10 pm - 12:30 pm	Discussion
12:30 pm	Group Photo / Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 5:30 pm	<u>Poster Session</u>
5:30 pm - 7:30 pm	Solid Liquid and Aerosol Interfaces
	Discussion Leader: Michael Grunze (University of Heidelberg)
5:30 pm - 6:10 pm	Jürgen Behm (Ulm University) "Chemical Reactions at the Electrified Solid-Liquid Interface"
6:10 pm - 6:30 pm	Discussion
6:30 pm - 7:10 pm	Clemens Heske (University of Nevada, Las Vegas) "Chemical and Electronic Properties of Surfaces in Solar Devices: From 'Simple' Band Gaps to Solid-Liquid Interfaces"
7:10 pm - 7:30 pm	Discussion
8:00 pm	Dinner
TUESDAY	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	Surface Photochemistry
	Discussion Leader: Bob Hamers (University of Wisconsin, Madison)
9:00 am - 9:40 am	Ulrike Diebold (Technical University of Vienna) "Oxide Surfaces at the Atomic Scale"
9:40 am - 10:00 am	Discussion
10:00 am	Coffee Break
10:30 am - 11:10 am	Igor Lyubinetsky (Pacific Northwest National Laboratory) "Molecular-Level Studies of Photochemistry on Rutile TiO ₂ Surfaces"
11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	Can Li (Dalian Institute of Chemical Physics Chinese Academy of Sciences) "Photocatalytic Evolution of Oxygen and Hydrogen on Cocatalysts"
12:10 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 5:30 pm	<u>Poster Session</u>
5:30 pm - 7:30 pm	Synthesis of Surfaces
	Discussion Leader: Francisco Zaera (University of California, Riverside)
5:30 pm - 6:10 pm	Steve George (University of Colorado, Boulder) "Dependence of Pt ALD on the Initial Substrate: From Pt Nanoparticles to

	Continuous Pt Thin Films"
6:10 pm - 6:30 pm	Discussion
6:30 pm - 7:10 pm	Christof Woll (Karlsruhe Institute of Technology) "Interfacial Systems Chemistry: Surface-Templated Assembly of Three-Dimensional Functional Frameworks"
7:10 pm - 7:30 pm	Discussion
8:00 pm	Dinner
WEDNESDAY	
7:30 am - 8:30 am	Breakfast
9:00 am - 11:30 am	Environmental Interfaces Discussion Leader: Vicki Grassian (University of Iowa)
9:00 am - 9:40 am	Gordon Brown (Stanford University) "Mineral-Aqueous Solution Interfacial Processes and their Impact on the Environment"
9:40 am - 10:00 am	Discussion
10:00 am	Coffee Break
10:30 am - 11:10 am	Franz Geiger (Northwestern University) "Coherent Vibrational Surface Spectroscopy of Organic Aerosol Particles from Amazonia, Southern Finland, and California"
11:10 am - 11:30 am	Discussion
11:30 am - 12:30 pm	Hot Topics in Surface Chemical Reactions Discussion Leader: Falko Netzer (University of Graz) TBA
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 5:30 pm	<u>Poster Session</u>
5:30 pm - 7:30 pm	Tribology Discussion Leader: Eddy Tysoe (University of Wisconsin, Milwaukee)
5:30 pm - 6:10 pm	Nic Spencer (ETH Zurich) "Making Surfaces Slippery with Polymer Brushes"
6:10 pm - 6:30 pm	Discussion
6:30 pm - 7:10 pm	Izabela Szlufarska (University of Wisconsin, Madison) "Chemical Origins of Interfacial Friction: Insights from Atomistic Simulations"
7:10 pm - 7:30 pm	Discussion
7:30 pm - 8:00 pm	<u>Business Meeting</u> <i>Nominations for the next Vice Chair; Fill out Conference Evaluation Forms; Discuss future Site & Scheduling preferences; Election of the next</i>

Vice Chair

8:00 pm Dinner

THURSDAY

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Gas-Surface Scattering and Reactions**

Discussion Leader: **Steve Bernasek** (Princeton University)

9:00 am - 9:40 am **Tim Minton** (Montana State University)
"Molecular Beam-Surface Scattering Studies of Energy Transfer and Reactions at the Gas-Liquid Interface"

9:40 am - 10:00 am Discussion

10:00 am Coffee Break

10:30 am - 11:10 am **Bill Hase** (Texas Tech University)
"Chemical Dynamics Simulations of Collisions of Projectile Atoms, Molecules, and Ions with Hydrocarbon Surfaces: Comparison with Experiment and Development of Models"

11:10 am - 11:30 am Discussion

11:30 am - 12:10 pm **Svetlana Schauermann** (Fritz-Haber-Institute)
"Hydrocarbon Conversions on Supported Model Catalysts"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 5:30 pm Poster Session

5:30 pm - 7:30 pm **Novel Materials and Environments**

Discussion Leader: **John Hemminger** (University of California, Irvine)

5:30 pm - 6:10 pm **Petra Rudolf** (University of Groningen)
"Production of Graphene and of Pillared Graphene Structures"

6:10 pm - 6:30 pm Discussion

6:30 pm - 7:10 pm **Harold Linnartz** (University of Leiden)
"Chem-ice-try: Solid State Pathways Towards Molecular Complexity in Space"

7:10 pm - 7:30 pm Discussion

8:00 pm Dinner

FRIDAY

7:30 am - 8:30 am Breakfast

9:00 am Departure

Chemical Reactions at Surfaces (2013)

Name	Organization	Participation	Status
ALEXANDROVA, ANASTASSIA N	UNIVERSITY OF CALIFORNIA, LOS ANGELES	Poster Presenter	Registered
ALTMAN, ERIC I	YALE UNIVERSITY	Poster Presenter	Registered
ARNADOTTIR, LINEY	OREGON STATE UNIVERSITY	Poster Presenter	Registered
ASHFORD, DENNIS L	UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL	Poster Presenter	Registered
BAEK, BYEONGJIN	UNIVERSITY OF HOUSTON	Poster Presenter	Registered
BARTELS, LUDWIG	UNIVERSITY OF CALIFORNIA RIVERSIDE	Poster Presenter	Registered
BEHM, JUERGEN	ULM UNIVERSITY	Speaker	Registered
BERNASEK, STEVEN L	PRINCETON UNIVERSITY	Discussion Leader	Registered
BONDARCHUK, ALEX	CIC ENERGIGUNE	Poster Presenter	Registered
BOSCOBOINIK, JORGE A	FRITZ HABER INSTITUTE OF THE MAX PLANCK SOCIETY	Poster Presenter	Registered
BROWN, GORDON E	STANFORD UNIVERSITY	Speaker	Registered
CAMPBELL, CHARLES T	UNIVERSITY OF WASHINGTON	Speaker	Registered
CAO, YAN	RUTGERS-NEWARK	Poster Presenter	Registered
CHEN, HSIN-YI	UNIVERSITY OF MILANO-BICOCCA,	Poster Presenter	Registered
CHEN, PENG	CORNELL UNIVERSITY	Speaker	Registered
CHOI, CHARINA L	STANFORD UNIVERSITY	Poster Presenter	Registered
CHORKENDORFF, IB	TECHNICAL UNIVERSITY OF DENMARK	Discussion Leader	Registered
CLAWIN, PETER M	UNIVERSITY OF OLDENBURG	Poster Presenter	Registered
CREMER, TILL	HARVARD UNIVERSITY	Poster Presenter	Registered
CROBU, MAURA	ETH ZÜRICH	Poster Presenter	Registered
CUI, YI	FRITZ-HABER-INSTITUT DER MAX-PLANCK-GESELLSCHAFT	Poster Presenter	Registered
DENG, QIBO	TECHNISCHE UNIVERSITÄT HAMBURG-HARBURG	Poster Presenter	Registered
DETWEILER, ZACHARY M	PRINCETON UNIVERSITY	Poster Presenter	Registered
DIEBOLD, ULRIKE	VIENNA UNIVERSITY OF TECHNOLOGY	Speaker	Registered
ENGLISH, CAROLINE R	UNIVERSITY OF WISCONSIN-MADISON DEPT OF CHEMISTRY	Poster Presenter	Registered
FOETTINGER, KARIN	VIENNA UNIVERSITY OF TECHNOLOGY	Poster Presenter	Registered
FREEDMAN, MIRIAM	PENNSYLVANIA STATE UNIVERSITY	Poster Presenter	Registered

FREUND, HAJO	FRITZ-HABER INSTITUTE	Discussion Leader	Registered
FÜCHTBAUER, HENRIK G.	INANO, AARHUS UNIVERSITY	Poster Presenter	Registered
GEIGER, FRANZ M	NORTHWESTERN U	Speaker	Registered
GELLMAN, ANDREW J	CARNEGIE MELLON UNIVERSITY	Poster Presenter	Registered
GEORGE, CASSANDRA M	NORTHWESTERN UNIVERSITY	Poster Presenter	Registered
GEORGE, STEVEN M	UNIVERSITY OF COLORADO - BOULDER	Speaker	Registered
GOMEZ, SARAH	NORTHWESTERN UNIVERSITY	Poster Presenter	Registered
GOTTERBARM, KARIN	FRIEDRICH ALEXANDER-UNIVERSITY ERLANGEN-NUREMBERG	Attendee	Registered
GRABOW, LARS C	UNIVERSITY OF HOUSTON	Poster Presenter	Registered
GRASSIAN, VICKI H	UNIVERSITY OF IOWA	Discussion Leader	Registered
GREEN, ISABEL X	UNIVERSITY OF WASHINGTON	Poster Presenter	Registered
GRUNZE, MICHAEL	HEIDELBERG UNIVERSITY	Discussion Leader	Registered
HAMERS, ROBERT J	UNIVERSITY OF WISCONSIN-MADISON	Discussion Leader	Registered
HASE, WILLIAM L	TEXAS TECH UNIVERSITY	Speaker	Registered
HE, DI	THE UNIVERSITY OF NEW SOUTH WALES	Poster Presenter	Registered
HEAD, ASHLEY R	LUND UNIVERSITY	Poster Presenter	Registered
HEMMINGER, JOHN C	UNIVERSITY OF CALIFORNIA-IRVINE	Discussion Leader	Registered
HENN, FREDERIC	OXFORD INSTRUMENTS OMICRON NANOSCIENCE	Poster Presenter	Registered
HERDIECH, MATTHEW W	YALE UNIVERSITY	Poster Presenter	Registered
HESKE, CLEMENS	UNLV	Speaker	Registered
HESS, FRANZISKA	JUSTUS-LIEBIG-UNIVERSITÄT GIEßEN	Poster Presenter	Registered
HOFFMANN, MAX J	TU MUNICH	Poster Presenter	Registered
HONG, WESLEY T	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	Poster Presenter	Registered
HUANG, WEIXIN	UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA	Poster Presenter	Registered
JOHNSON, ALEXIS M	NORTHWESTERN UNIVERSITY	Poster Presenter	Registered
JUNG, SOON JUNG	MAX-PLANCK-INSTITUTE FOR SOLID STATE RESEARCH	Poster Presenter	Registered
KAJJOUT, MOHAMMED	LABORATORY MSAP, UNIVERSITY OF LILLE 1	Attendee	Registered
KAR, PRASENJIT	SHELL INDIA MARKET PRIVATE LIMITED, IR&D	Attendee	Registered
KARAKALOS, STAVROS	UNIVERSITY OF CALIFORNIA RIVERSIDE	Poster Presenter	Registered

KIM, YU KWON	AJOU UNIVERSITY	Poster Presenter	Registered
KIRSCH, HARALD	FRITZ-HABER-INSTITUT BERLIN	Poster Presenter	Registered
KISS, JANOS	UNIVERSITY OF SZEGED	Poster Presenter	Registered
KOENIG, MICHAEL	TU MUNICH	Poster Presenter	Registered
KREIKEMEYER-LORENZO, DAGMAR	KARLSRUHE INSTITUTE OF TECHNOLOGY	Poster Presenter	Registered
KRONAWITTER, COLEMAN X	PRINCETON UNIVERSITY	Poster Presenter	Registered
LI, CAN	DALIAN INSTITUTE OF CHEMICAL PHYSICS	Speaker	Registered
LINDNER, ROBERT	JOHANNES GUTENBERG-UNIVERSITY MAINZ	Poster Presenter	Registered
LINNARTZ, HAROLD	UNIVERSITY OF LEIDEN	Speaker	Registered
LORDI, VINCENZO	LAWRENCE LIVERMORE NATIONAL LABORATORY	Poster Presenter	Registered
LYUBINETSKY, IGOR	PACIFIC NORTHWEST NATIONAL LAB	Speaker	Registered
MACKUS, ADRIE J	EINDHOVEN UNIVERSITY OF TECHNOLOGY	Poster Presenter	Registered
MAIER, SABINE	UNIVERSITY OF ERLANGEN-NUERNBERG	Poster Presenter	Registered
MARTIN, NATALIA M	LUND UNIVERSITY	Poster Presenter	Registered
MCEWEN, JEAN-SABIN	WASHINGTON STATE UNIVERSITY	Poster Presenter	Registered
METTE, GERSON	PHILIPPS-UNIVERSITÄT MARBURG	Poster Presenter	Registered
MIGNANI, GERARD A	SOLVAY	Attendee	Registered
MINTON, TIM	MONTANA STATE UNIVERSITY	Speaker	Registered
MOORE, JAMES C	COASTAL CAROLINA UNIVERSITY	Poster Presenter	Registered
NAKAMURA, JUNJI	UNIVERSITY OF TSUKUBA	Poster Presenter	Registered
NETZER, FALKO	KARL-FRANZENS UNIVERSITY	Discussion Leader	Registered
ONEL, SANTIAGO	KARLSRUHE INSTITUTE OF TECHNOLOGY	Poster Presenter	Registered
OZBEK, OLUS M.	EINDHOVEN UNIVERSITY OF TECHNOLOGY	Poster Presenter	Registered
PACCHIONI, GIANFRANCO	UNIVERSITÀ DEGLI STUDI MILANO-BICOCCA	Speaker	Registered
PACI, IRINA	UNIVERSITY OF VICTORIA	Poster Presenter	Registered
PAL, JAGRITI	IMEM-CNR UOS GENOA	Poster Presenter	Registered
PAPP, CHRISTIAN	UNI ERLANGEN	Poster Presenter	Registered
PECZONCZYK, SABRINA L	UNIVERSITY OF MICHIGAN	Poster Presenter	Registered
PEKÖZ, RENGİN	MAX PLANCK INSTITUTE FOR POLYMER RESEARCH	Poster Presenter	Registered

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POGODIN, SERGEY	INSTITUT CATALÀ D'INVESTIGACIÓ QUÍMICA	Poster Presenter	Registered
POTAPENKO, DENIS V	COLUMBIA UNIVERSITY	Poster Presenter	Registered
PRATIHAR, SUBHA	TEXAS TECH UNIVERSITY	Poster Presenter	Registered
RAVAL, RASMITA	UNIVERSITY OF LIVERPOOL	Speaker	Registered
RIEBOLDT, FELIX	INTERDISCIPLINARY NANOSCIENCE CENTER (INANO)	Poster Presenter	Registered
RISSE, THOMAS	FREIE UNIVERSITÄT BERLIN	Attendee	Registered
ROSENBERG, SAMANTHA G	JOHNS HOPKINS UNIVERSITY	Poster Presenter	Registered
RUDOLF, PETRA	UNIVERSITY OF GRONINGEN	Speaker	Registered
SAEYS, MARK	NATIONAL UNIVERSITY OF SINGAPORE	Poster Presenter	Registered
SCHAUERMANN, SWETLANA	FRITZ-HABER INSTITUTE	Speaker	Registered
SETVIN, MARTIN	TU WIEN	Poster Presenter	Registered
SEZEN, HIKMET	KARLSRUHER INSTITUT FÜR TECHNOLOGIE	Poster Presenter	Registered
SOLYMOSI, FRIGYES	UNIVERSITY OF SZEGED	Poster Presenter	Registered
SPENCER, NICHOLAS D	ETH ZURICH	Speaker	Registered
STAIR, PETER C	NORTHWESTERN UNIVERSITY	Chair	Registered
STEINRUCK, HANS-PETER	UNIVERSITY ERLANGEN-NURNBERG	Vice Chair	Registered
STOERZINGER, KELSEY A	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	Poster Presenter	Registered
SUN, WENHAO	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	Poster Presenter	Registered
SUN, HUAXING	UNIVERSITY OF CALIFORNIA, RIVERSIDE	Poster Presenter	Registered
SZLUFARSKA, IZABELA	UNIVERSITY OF WISCONSIN-MADISON	Speaker	Registered
TYSOE, EDDY	UNIVERSITY OF WISCONSIN-MILWAUKEE	Discussion Leader	Registered
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VILHELMSSEN, LASSE B	AARHUS UNIVERSITY	Poster Presenter	Registered
VOLLNHALS, FLORIAN	FAU ERLANGEN-NÜRNBERG	Poster Presenter	Registered
WACHS, ISRAEL E	LEHIGH UNIVERSITY	Poster Presenter	Registered
WAGNER, MARGARETA	KARL-FRANZENS-UNIVERSITÄT GRAZ	Poster Presenter	Registered
WEI, YINYING	INANO CENTER, AARHUS UNIVERSITY	Poster Presenter	Registered
WILLIAMS, RHEA M	UNIVERSITY OF COLORADO BOULDER	Poster Presenter	Registered
WITTSTOCK, ARNE	UNIVERSITY BREMEN, IAPC	Poster	Registered

		Presenter	
WOLL, CHRISTOF	KARLSRUHER INSTITUT FÜR TECHNOLOGIE	Speaker	Registered
YANG, JUDITH C	UNIVERSITY OF PITTSBURGH	Poster Presenter	Registered
ZAERA, FRANCISCO	UNIVERSITY OF CALIFORNIA - RIVERSIDE	Discussion Leader	Registered
ZEHRA, TASHFEEN	ZERNIKE INSTITUTE FOR ADVANCED MATERIALS,	Poster Presenter	Registered
ZHANG, ZHENRONG	BAYLOR UNIVERSITY	Poster Presenter	Registered
ZHU, JUNFA J.F.	UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA	Poster Presenter	Registered
121 Attendees			

PATENT CERTIFICATION

Gordon Research Conferences
Awardee

☐ Interim Certification

DE-SC0009388 (2013Chemical Reactions at Surfaces)
DOE Prime and/or Subcontract Nos.

☒ Final Certification

Awardee hereby certifies unless indicated to the contrary, that:

1. All procedures for identifying and disclosing subject inventions as required by the patent clause of the contract have been followed throughout the reporting period.
2. There were no subcontracts or purchase orders involving research, development, and demonstration except as follows: (a separate certification must be provided to DOE for each subcontract or purchase order awarded.)
3. No inventions or discoveries were made or conceived in the course of or under this contract other than the following (Certification includes ☒, does not include ☐ all subcontracts):

<u>TITLE</u>	<u>INVENTOR</u>	<u>DATE REPORTED</u>	<u>DOE "S" NO.*</u>
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n/a

4. The completion date of this contract is as follows:
5. The following period is covered by this certification:

<u>January</u>	<u>15,</u>	<u>2013</u>	to	<u>January</u>	<u>14,</u>	<u>2014</u>
Month	Day	Year		Month	Day	Year



Gordon Research Conferences
Contractor

Signature

Nancy Ryan Gray

Director and President
Title

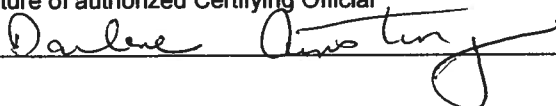
512 Liberty Lane, West Kingston, RI 02892
Address

6/12/13
Date of Certification

* Also include Subcontract No. if available.

NOTE: A positive certification for this Item 3 does not negate the requirement for furnishing to DOE a fully executed Patent Certification from each subawardee identified in Item 2.

**TANGIBLE PERSONAL PROPERTY REPORT
SF- 428**

		Page 1	of 1 Pages
1. Federal Agency and Organization Element to Which Report is Submitted DOE	2. Federal Grant or Other Identifying Number Assigned by Federal Agency DE-SC0009388	3a. DUNS 07-571-2877	3b. EIN 26-0150662
4. Recipient Organization (Name and complete address including zip code) GORDON RESEARCH CONFERENCES 512 LIBERTY LANE WEST KINGSTON, RI 02892-1502		5. Recipient Account or Identifying Number 2013 Chemical Reactions at Surfaces	
6. Attachment (Check applicable) <input type="checkbox"/> Annual Report (SF-428-A) <input checked="" type="checkbox"/> Final (Award Closeout) Report (SF-428-B) <input type="checkbox"/> Disposition Report/Request (SF-428-C)		7. Supplemental Sheet <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
8. Comments NO PROPERTY			
9a. Typed or Printed Name and Title of Authorized Certifying Official DARLENE ARMSTRONG CONFERENCE OPERATIONS & GRANTS MNGR		9c. Telephone (area code, number, extension) 401-360-1505	
		9d. Email address GRANTS@GRC.ORG	
9b. Signature of authorized Certifying Official 		9e. Date report submitted (Month, Day, Year) 6/13/13	
		10. Agency use only	

Instructions for Tangible Personal Property Report: SF-428

The estimated annual public reporting burden for the collection of information on this form and its attachments is estimated to average 2.75 hours per respondent, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0043), Washington, DC 20503.

This is a standard form to be used by awarding agencies to collect information related to tangible personal property (equipment and supplies) when required by a Federal financial assistance award. The form consists of the cover sheet (SF-428) and three attachments to be used as required: Annual Report, SF428-A; Final (Award Closeout) Report, SF-428-B; and a Disposition Request/Report, SF-428-C. A Supplemental Sheet, SF-428S, may be used to provide detailed individual item information.

A. General Instructions:

Tangible personal property means property of any kind, except real property, that has physical existence. It includes equipment and supplies. It does not include copyrights, patents or securities. For convenience, throughout this form and its attachments, the term property will be synonymous with tangible personal property. The terms equipment and supplies will be used when referring to specific requirements.

Property may be provided by the awarding agency or acquired by the recipient with award funds. Federally-owned property consists of items that were furnished by the Federal government.

Recipients of Federal assistance awards may be required to provide Federal awarding agencies with information concerning property in their custody annually, at award closeout or when the property is no longer needed. Specific requirements will vary based on award provisions, the type of property (equipment or supplies) and whether the property is Federally-owned. This reporting form and its attachments are intended to assist recipients to provide necessary information when it is required.

1. Federal Agency and Organizational Element to Which Report is Submitted. Enter the name of the Federal agency and the agency organization element identified in the award document or as otherwise instructed by the agency. The organizational element is a sub-agency within a Federal agency. For example, the Air Force Office of Scientific Research (AFOSR) is an organizational element within the Department of Defense.

2. Federal Grant or Other Identifying Number Assigned by Federal Agency. Enter the Federal grant, cooperative agreement or other Federal financial assistance award instrument number or other identifying number assigned to the Federal financial assistance award.

3a. DUNS. Enter the recipient organization's Data Universal Numbering System (DUNS) number or Central Contract Registry extended DUNS number. The DUNS number is also referred to as the Universal Identifier.

3b. EIN. Enter the recipient organization's Employer Identification Number (EIN) as assigned by the Internal Revenue Service.

4. Recipient Organization. Enter the name and complete address, including zip code, of the recipient organization.

5. Recipient Account or Identifying Number. Enter the account number or other identifying number assigned to the award by the recipient. This number is for the recipient's use and is not required by the Federal agency.

6. Attachment. Check the applicable line to indicate the type of attachment being submitted. Use the Annual Report, SF-428-A, when required to provide annual inventory listings of Federally-owned property. Use the Final Report, SF-428-B, when required to provide property information in connection with the closeout of an award. Use the Disposition Request/Report, SF-428-C, when required to request disposition instructions for or to report the disposal of Federally-owned property or acquired equipment, at any time other than award closeout (i.e., during the award period or after award closeout as long as the Federal government retains an interest in the item).

7. Supplemental Sheet. Check the applicable block to indicate whether a Supplemental Sheet is attached. Recipients may use the SF-428S or equivalent document such as a computer print out to provide required detailed individual item information.

8. Comments. Provide any explanations or additional information in this block. Attach additional sheets if necessary.

9a. Typed or Printed Name and Title of Authorized Certifying Official. Enter the full name and title of the recipient representative authorized to sign this report.

b. Signature of Authorized Certifying Official. Original signature of the recipient's authorized certifying official.

c. Telephone. Enter the telephone number of the individual listed in Line 9a.

d. Email address. Enter the email address of the individual listed in 9a.

e. Date report submitted. Enter the date the report is submitted to the Federal agency.

10. Agency use only. This section is reserved for Federal agency use only.

FEDERAL FINANCIAL REPORT

(Follow form instructions)

1. Federal Agency and Organizational Element to Which Report is Submitted DOE	2. Federal Grant or Other Identifying Number Assigned by Federal Agency (To report multiple grants, use FFR Attachment) OE-SC0009388	Page 1	of 1	pages
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3. Recipient Organization (Name and complete address including Zip code) Gordon Research Conferences, 512 Liberty Lane, West Kingston, RI 02892

4a. DUNS Number 07-571-2877	4b. EIN 26-0150662	5. Recipient Account Number or Identifying Number (To report multiple grants, use FFR Attachment) 2013 Chemical Reactions at Surfaces	6. Report Type <input type="checkbox"/> Quarterly <input type="checkbox"/> Semi-Annual <input type="checkbox"/> Annual <input checked="" type="checkbox"/> Final	7. Basis of Accounting <input checked="" type="checkbox"/> Cash <input type="checkbox"/> Accrual
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8. Project/Grant Period From: (Month, Day, Year) 1/15/2013	To: (Month, Day, Year) 1/14/2014	9. Reporting Period End Date (Month, Day, Year) 1/14/2014
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10. Transactions	Cumulative
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(Use lines a-c for single or multiple grant reporting)

Federal Cash (To report multiple grants, also use FFR Attachment):	
a. Cash Receipts	10,000
b. Cash Disbursements	10,000
c. Cash on Hand (line a minus b)	0

(Use lines d-o for single grant reporting)

Federal Expenditures and Unobligated Balance:	
d. Total Federal funds authorized	10,000
e. Federal share of expenditures	10,000
f. Federal share of unliquidated obligations	0
g. Total Federal share (sum of lines e and f)	10,000
h. Unobligated balance of Federal funds (line d minus g)	0

Recipient Share:	
i. Total recipient share required	
j. Recipient share of expenditures	
k. Remaining recipient share to be provided (line i minus j)	

Program Income:	
l. Total Federal program income earned	
m. Program income expended in accordance with the deduction alternative	
n. Program income expended in accordance with the addition alternative	
o. Unexpended program income (line l minus line m or line n)	

11. Indirect Expense	a. Type	b. Rate	c. Period From	Period To	d. Base	e. Amount Charged	f. Federal Share
	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	g. Totals:					N/A	N/A

12. Remarks: Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation:

13. Certification: By signing this report, I certify to the best of my knowledge and belief that the report is true, complete, and accurate, and the expenditures, disbursements and cash receipts are for the purposes and intent set forth in the award documents. I am aware that any false, fictitious, or fraudulent information may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)

a. Typed or Printed Name and Title of Authorized Certifying Official Darlene Armstrong Conference Operations & Grants Manager	c. Telephone (Area code, number and extension) 401-360-1505
b. Signature of Authorized Certifying Official 	d. Email address grants@grc.org
	e. Date Report Submitted (Month, Day, Year) 6/13/13
14. Agency use only:	

Standard Form 425 - Revised 6/28/2010
 OMB Approval Number 0348-0061
 Expiration Date: 10/31/2011

Paperwork Burden Statement
 According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is 0348-0061. Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0061), Washington, DC 20503.