

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the 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 this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA, 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.
PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 29-07-2021	2. REPORT TYPE Final Report	3. DATES COVERED (From - To) 23-Sep-2019 - 22-Nov-2020
---	--------------------------------	---

4. TITLE AND SUBTITLE Final Report: High Dimensional Flow Cytometer for Microbiological Analysis and Education	5a. CONTRACT NUMBER W911NF-19-1-0529
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER 106012

6. AUTHORS	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES AND ADDRESSES University of California - Merced 5200 North Lake Road Merced, CA 95343 -5705	8. PERFORMING ORGANIZATION REPORT NUMBER
---	--

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES) U.S. Army Research Office P.O. Box 12211 Research Triangle Park, NC 27709-2211	10. SPONSOR/MONITOR'S ACRONYM(S) ARO
	11. SPONSOR/MONITOR'S REPORT NUMBER(S) 74322-LS-REP.1

12. DISTRIBUTION AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.
--

13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:	17. LIMITATION OF ABSTRACT	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Clarissa Nobile
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU	19b. TELEPHONE NUMBER 209-228-2427

RPPR Final Report
as of 21-Aug-2021

Agency Code: 21XD

Proposal Number: 74322LSREP

Agreement Number: W911NF-19-1-0529

INVESTIGATOR(S):

Name: PhD Aaron Hernday
Email: ahernday@ucmerced.edu
Phone Number: 2092282450
Principal: N

Name: PhD Clarissa Jane Nobile
Email: cnobile@ucmerced.edu
Phone Number: 2092282427
Principal: Y

Name: PhD David Michael Gravano
Email: dgravano@ucmerced.edu
Phone Number: 2092284508
Principal: N

Name: PhD Katrina Kaye Hoyer
Email: khoyer2@ucmerced.edu
Phone Number: 2092284229
Principal: N

Name: PhD Kirk Jensen
Email: kjensen5@ucmerced.edu
Phone Number: 2092282460
Principal: N

Organization: **University of California - Merced**

Address: 5200 North Lake Road, Merced, CA 953435705

Country: USA

DUNS Number: 113645084

EIN: 943067788

Report Date: 22-Feb-2021

Date Received: 29-Jul-2021

Final Report for Period Beginning 23-Sep-2019 and Ending 22-Nov-2020

Title: High Dimensional Flow Cytometer for Microbiological Analysis and Education

Begin Performance Period: 23-Sep-2019

End Performance Period: 22-Nov-2020

Report Term: 0-Other

Submitted By: PhD Clarissa Nobile

Email: cnobile@ucmerced.edu

Phone: (209) 228-2427

Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees:

STEM Participants:

Major Goals: The University of California, Merced (UC Merced), which opened to students in 2005, is the first new research university built in the 21st century. UC Merced's overall 57% underrepresented minority rate is the highest in the University of California system, with other campuses ranging from 17% to 42%. While serving a large proportion of ethnic minorities, UC Merced has also rapidly become recognized for its research capacity. Here we propose to acquire the Bio-Rad ZE5 flow cytometer for expansion of research capacity, to serve existing research projects in a wide range of disciplines, to support existing STEM programs and curricula, and to increase participation in STEM fields among students from high school to university levels.

The Bio-Rad ZE5 is a newly released, state-of-the-art flow cytometer that has achieved major advances in fluorescence detection capabilities and features. We propose to house this instrument in the Stem Cell Instrumentation Foundry (SCIF) core facility that oversees the university's current flow cytometry/cell sorting resources. In our analysis of the available instruments, we determined that the Bio-Rad ZE5 will provide all the detection channels our investigators will need (with room to grow), and many useful features not found in other

RPPR Final Report as of 21-Aug-2021

instruments that will benefit both our researchers, STEM students, and our core facility lab staff.

Our team is comprised of 2 principal investigators. Dr. Clarissa Nobile, the lead principal investigator, whose lab studies the molecular and mechanistic bases of microbial communities (e.g. biofilms), and Dr. David Gravano, the co-lead principal investigator, who manages flow cytometry resources at UC Merced's SCIF. High-throughput genetic screens and assays performed in the Nobile lab will greatly benefit from the Bio-Rad ZE5's unique capabilities. The SCIF's technical expertise in flow cytometry will ensure that the Bio-Rad ZE5 will have wide accessibility, proper maintenance, and effective user training. Three additional co-investigators have described their labs' research projects that will specifically benefit from the Bio-Rad ZE5. We estimate that at least 10 current UC Merced labs will utilize the Bio-Rad ZE5 for approximately 900 hours per year for research purposes. UC Merced is currently undergoing a campus expansion called the "2020 Project" that will double the physical infrastructure of the campus by fall 2020, adding a new Biosafety Level 3 lab that this instrument would also support along with many new faculty in the life sciences.

Additionally, the Bio-Rad ZE5 will support the undergraduate curriculum at UC Merced through collaboration with the HHMI-funded Inclusive Excellence in Science Education program. This program will utilize the Bio-Rad ZE5 to provide course-based research experiences that will support UC Merced's new General Education curriculum that requires a "culminating experience" for all students before graduation. We will further supplement high school and undergraduate research and training programs including the NSF-funded CREST Center for Cellular and Biomolecular Machines Summer Internship Program and the Science and Technology Enrichment Program, the CalTeach Bobcat Summer STEM Academy and the CalTeach Teacher Summer Institute, the NIH-funded MARC U*STAR program, and the UC Merced Student Success Internship program. These programs, combined with the existing and future faculty research projects, will ensure broad utilization of the valuable technique of flow cytometry and the new Bio-Rad ZE5 instrument.

Accomplishments: With this award, we acquired the Bio-Rad ZE5 flow cytometer. This instrument allowed for expansion of UC Merced's research capacity to serve existing research projects in a wide range of disciplines, to support existing STEM programs and curricula, and to increase participation in STEM fields among students from high school to university levels.

The Bio-Rad ZE5 is a newly released, state-of-the-art flow cytometer that has achieved major advances in fluorescence detection capabilities and features. This instrument is housed in the Stem Cell Instrumentation Foundry (SCIF) core facility that oversees the university's current flow cytometry/cell sorting resources. The Bio-Rad ZE5 has all the detection channels our investigators need (with room to grow), and many useful features not found in other instruments that are benefitting both our researchers, STEM students, and our core facility lab staff.

Our team is comprised of 2 principal investigators. Dr. Clarissa Nobile, the lead principal investigator, whose lab studies the molecular and mechanistic bases of microbial communities (e.g., biofilms), and Dr. David Gravano, the co-lead principal investigator, who manages flow cytometry resources at UC Merced's SCIF. High-throughput genetic screens and assays performed in the Nobile lab have greatly benefited from the Bio-Rad ZE5's unique capabilities. The SCIF's technical expertise in flow cytometry has ensured that the Bio-Rad ZE5 has had wide accessibility, proper maintenance, and effective user training. Three additional co-investigators have specifically benefited from the Bio-Rad ZE5 and many current UC Merced labs have utilized the Bio-Rad ZE5 for research purposes. UC Merced has undergone a campus expansion called the "2020 Project" that doubled the physical infrastructure of the campus, adding a new Biosafety Level 3 lab that this instrument is also supporting along with many new faculty in the life sciences. We expect that within the next year, we will be seeing several publications acknowledging use of this instrument.

Additionally, the Bio-Rad ZE5 has supported the undergraduate curriculum at UC Merced through collaboration with the HHMI-funded Inclusive Excellence in Science Education program. This program utilized the Bio-Rad ZE5 to provide course-based research experiences that supported UC Merced's new General Education curriculum that requires a "culminating experience" for all students before graduation. The instrument was also used in high school and undergraduate research and training programs including the NSF-funded CREST Center for Cellular and Biomolecular Machines Summer Internship Program and the Science and Technology Enrichment Program, the CalTeach Bobcat Summer STEM Academy and the CalTeach Teacher Summer Institute, the NIH-funded MARC U*STAR program, and the UC Merced Student Success Internship program.

RPPR Final Report as of 21-Aug-2021

Training Opportunities: 32 graduate and undergraduate students were trained on the Bio-Rad ZE5 during this reporting period for their research projects.

The Bio-Rad ZE5 was also used to support the undergraduate curriculum at UC Merced through collaboration with the HHMI-funded Inclusive Excellence in Science Education program. This program utilized the Bio-Rad ZE5 to provide course-based research experiences that supported UC Merced's new General Education curriculum.

The Bio-Rad ZE5 was also used in high school and undergraduate research and training programs including the NSF-funded CREST Center for Cellular and Biomolecular Machines Summer Internship Program and the Science and Technology Enrichment Program, the CalTeach Bobcat Summer STEM Academy and the CalTeach Teacher Summer Institute, the NIH-funded MARC U*STAR program, and the UC Merced Student Success Internship program.

Results Dissemination: Nothing to Report

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

Partners

,

I certify that the information in the report is complete and accurate:

Signature: Clarissa J. Nobile

Signature Date: 7/29/21 7:45PM

Proposal No. 74322-LS-REP - High Dimensional Flow Cytometer for Microbiological Analysis and Education

With this award, we acquired the Bio-Rad ZE5 flow cytometer. This instrument allowed for expansion of UC Merced's research capacity to serve existing research projects in a wide range of disciplines, to support existing STEM programs and curricula, and to increase participation in STEM fields among students from high school to university levels.

The Bio-Rad ZE5 is housed in the Stem Cell Instrumentation Foundry (SCIF) core facility that oversees the university's current flow cytometry/cell sorting resources.

Our team is comprised of 2 principal investigators: Dr. Clarissa Nobile, the lead principal investigator, whose lab studies the molecular and mechanistic bases of microbial communities (e.g., biofilms), and Dr. David Gravano, the co-lead principal investigator, who manages flow cytometry resources at UC Merced's SCIF. High-throughput genetic screens and assays performed in the Nobile lab have greatly benefited from the Bio-Rad ZE5's unique capabilities. The SCIF's technical expertise in flow cytometry has ensured that the Bio-Rad ZE5 has had wide accessibility, proper maintenance, and effective user training. Three additional co-investigators have specifically benefited from the Bio-Rad ZE5 and many current UC Merced labs have utilized the Bio-Rad ZE5 for research purposes. UC Merced has undergone a campus expansion called the "2020 Project" that doubled the physical infrastructure of the campus, adding a new Biosafety Level 3 lab that this instrument is also supporting along with many new faculty in the life sciences. We expect that within the next year, we will be seeing several publications acknowledging use of this instrument.

Additionally, the Bio-Rad ZE5 has supported the undergraduate curriculum at UC Merced through collaboration with the HHMI-funded Inclusive Excellence in Science Education program. This program utilized the Bio-Rad ZE5 to provide course-based research experiences that supported UC Merced's new General Education curriculum that requires a "culminating experience" for all students before graduation. The instrument was also used in high school and undergraduate research and training programs including the NSF-funded CREST Center for Cellular and Biomolecular Machines Summer Internship Program and the Science and Technology Enrichment Program, the CalTeach Bobcat Summer STEM Academy and the CalTeach Teacher Summer Institute, the NIH-funded MARC U*STAR program, and the UC Merced Student Success Internship program.