**Final Report: Monolithic Silicon Microbolometer Materials for Uncooled Infrared Detectors**

Research was summarized in two Ph.D. theses that were finished within the period of performance, including a no-cost extension. One was entitled "Thin Film Materials and Devices for Resistive Temperature Sensing Applications" by Hitesh Basantani and the other entitled "Reactive sputter deposition of vanadium, nickel, and molybdenum oxide thin films for use in uncooled infrared imaging" by Yao Jin. This research also resulted in a total of 29 other articles and conference papers.

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

**Subject Terms**
- microbolometer
- infrared imaging
- vanadium oxide
- temperature sensing
- biased-target deposition

**Security Classification**
- UU
- UU
- UU
- UU
- UU
ABSTRACT

Research was summarized in two Ph.D. theses that were finished within the period of performance, including a no-cost extension. One was entitled "Thin Film Materials and Devices for Resistive Temperature Sensing Applications" by Hitesh Basantani and the other entitled "Reactive sputter deposition of vanadium, nickel, and molybdenum oxide thin films for use in uncooled infrared imaging" by Yao Jin. This research also resulted in a total of 29 other articles and conference papers.
Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

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<td>04/10/2012 12.00</td>
<td>MingLiang Zhang, D. A. Drabold. The microscopic response method: Theory of transport for systems with both topological and thermal disorder, physica status solidi (b), (05 2011): 0. doi: 10.1002/pssb.201147036</td>
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<td>04/10/2012 22.00</td>
<td>D. A. Drabold. Silicon: the gulf between crystalline and amorphous, physica status solidi (RRL) - Rapid Research Letters, (11 2011): 0. doi: 10.1002/pssr.201105444</td>
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<td>04/10/2012 21.00</td>
<td>James P. Lewis, Pavel Jelinek, José Ortega, Alexander A. Demkov, Daniel G. Trabada, Barry Haycock, Hao Wang, Gary Adams, John K. Tomfohr, Enrique Abad, Hong Wang, David A. Drabold. Advances and applications in the FIREBALLab initio tight-binding molecular-dynamics formalism, physica status solidi (b), (08 2011): 0. doi: 10.1002/pssb.201147299</td>
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Mingliang Zhang, D. Drabold. Comparison of the Kubo formula, the microscopic response method, and


Devin A. Mourey, Dalong A. Zhao, Jie Sun, Thomas N. Jackson. Fast PEALD ZnO Thin-Film Transistor Circuits, IEEE Transactions on Electron Devices, (02 2010): 0. doi: 10.1109/TED.2009.2037178


TOTAL: 23
Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

Received  Paper

TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received  Paper

11/03/2012  1.00  Mark W. Horn, David L. Allara, Orlando M. Cabarcos, Hitesh A. Basantani, S. S. N. Bharadwaja, Jing Li, Bryan D. Gauntt, Sami Antrazi, Elizabeth C. Dickey. Comparison of ion beam and magnetron sputtered vanadium oxide thin films for uncooled IR imaging, Proc. SPIE 8012. 04-DEC-11, . . . ,

TOTAL: 1
Peer-Reviewed Conference Proceeding publications (other than abstracts):

01/06/2014 28.00 Hitesh A. Basantani, Hang-Beum Shin, T. N. Jackson, Mark W. Horn, Bjørn F. Andresen, Gabor F. Fulop, Charles M. Hanson, Paul R. Norton, Patrick Robert. Vertically integrated pixel microbolometers for IR imaging using high-resistivity VO, SPIE Defense, Security, and Sensing. 02-MAY-13, Baltimore, Maryland, USA. : ,

01/06/2014 27.00 Yao Jin, Hitesh A. Basantani, Adem Ozcelik, Tom N. Jackson, Mark W. Horn, Bjørn F. Andresen, Gabor F. Fulop, Charles M. Hanson, Paul R. Norton, Patrick Robert. High-resistivity and high-TCR vanadium oxide thin films for infrared imaging prepared by bias target ion-beam deposition, SPIE Defense, Security, and Sensing. 02-MAY-13, Baltimore, Maryland, USA. : ,


04/09/2012 6.00 Song Won Ko, Jing Li, Myung-Yoon Lee, Elizabeth Dickey, Thomas Jackson, Susan Trollier-McKinstry. New materials for uncooled IR imaging: nickel manganite thin films grown by spin spray, Infrared Technology and Applications XXXVII. 09-APR-11, Orlando, Florida, USA. : ,

TOTAL: 5

(d) Manuscripts

Received Paper

TOTAL:
**Books**

Received Book

TOTAL:

Received Book Chapter

TOTAL:

**Patents Submitted**

**Patents Awarded**

**Awards**

**Graduate Students**

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FTE Equivalent: 0.00

Total Number: 2

**Names of Post Doctorates**

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Names of Faculty Supported

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Names of Under Graduate students supported

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Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period.

The number of undergraduates funded by this agreement who graduated during this period: ...... 0.00
The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields: ...... 0.00
The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields: ...... 0.00
Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale): ...... 0.00
Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering: ...... 0.00
The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense ...... 0.00
The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: ...... 0.00

Names of Personnel receiving masters degrees

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Names of personnel receiving PHDs

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<td>Yao Jin</td>
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Names of other research staff

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Sub Contractors (DD882)
Inventions (DD882)

Scientific Progress
Final Report: Monolithic Silicon Microbolometer Materials for Uncooled Infrared Detectors. Research was summarized in two Ph.D. theses that were finished within the period of performance, including a no-cost extension. One was entitled “Thin Film Materials and Devices for Resistive Temperature Sensing Applications” by Hitesh Basantani and the other entitled “Reactive sputter deposition of vanadium, nickel, and molybdenum oxide thin films for use in uncooled infrared imaging” by Yao Jin. This research also resulted in a total of 29 other articles and conference papers.

Technology Transfer