**Report Information**

<table>
<thead>
<tr>
<th>Award Type</th>
<th>Award Number</th>
<th>Prime DUNS</th>
<th>Calendar Year / Quarter</th>
<th>Final Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant</td>
<td>0934860</td>
<td>066470972</td>
<td>2011 / 2</td>
<td>No</td>
</tr>
</tbody>
</table>

**Award Recipient Information**

- **Recipient DUNS Number**: 066470972
- **Recipient Account Number**: 219045
- **Recipient Congressional District**: 02
- **Parent DUNS Number**: 066470972
- **Recipient Type**: 2U.G6.M8.OH.VW
- **Recipient Legal Name**: AUBURN UNIVERSITY
- **Recipient DBA Name**: 
- **Recipient Address 1**: 107 SAMFORD HALL
- **Recipient Address 2**: 
- **Recipient City**: AUBURN
- **Recipient State**: AL
- **Recipient ZIP Code + 4**: 368490001
- **Recipient Country**: USA

**Project / Award Information**

- **Funding Agency Code**: 4900
- **Awarding Agency Code**: 4900
- **Program Source (TAS) Code**: 49-0101
- **CFDA Number**: 47.082
- **Amount of Award**: 287553.00
- **Award Date**: 08/20/2009
- **Award Description**: Light microscopy is the major biological research technology that enabled modern knowledge of structure and function of biological cells. With the discovery of super-resolution light microscopy in the late 1990s the size of observable features diminished twenty times to as small as ten nanometers, promising to revolutionize sub-cellular and molecular biology research. Super-resolution microscopy is still in its infancy. Specifically, imaging speeds are below 1 frame/s. The research objective of this proposal is the development of a novel microscopy platform that combines spatial super-resolution in all three dimensions with high imaging speed of 5000 frames/s to enable study of fast intracellular events. The principle of the method is based on simultaneous illumination of the

**Total Number of Sub Awards less than $25,000/award**: 0
**Total Amount Sub Awards less than $25,000/award**: 0.00
**Total Number of Sub Awards to Individuals**: 0
**Total Amount of Sub Awards to Individuals**: 0.00
**Total Number of Payments to Vendors less than $25,000/award**: 9
**Total Amount of Payments to Vendors less than $25,000/award**: 1212.33

**July 6, 2011**
object by about a hundred thousand narrow light spots, each focused to the diffraction-limited size. The illumination pattern is generated by a computer-controlled digital micro-mirror device (DMD); the pattern's quality satisfies the rigid super-resolution conditions as tested by preliminary experiments. The super-resolution image will be reconstructed using 9-25 frames recorded for different illuminations. Theoretically, in linear mode the 3D resolution enhancement is two-fold compared to the classical diffraction limit. In non-linear mode of saturated fluorescence further resolution enhancement occurs with no theoretical limit. This supreme 3D imaging capability will be due to the super-resolution in axial direction and low out-of-focus light. The developed technique will be widely applicable to the study of the structural organization and dynamic processes in living cells, in particular in the area of mitochondria research.
### Project Information

<table>
<thead>
<tr>
<th>Project Name or Project/ Program Title</th>
<th>Activity Codes (NAICS or NTEE-NPC) (up to 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-speed Super-Resolution Light Microscopy for 3D Imaging of Living Cells</td>
<td>Activity Code 1 B43 - NTEE</td>
</tr>
<tr>
<td>Computational algorithms for super-resolution image reconstruction were designed with initial implementation as MatLab software computer codes.</td>
<td>Activity Code 2</td>
</tr>
<tr>
<td>Dr. Igor Makarenko from Ioffe Institute, Russian Academy of Sciences, St. Petersburg, Russia started his 11 weeks long J-1 visa visit to work on the project.</td>
<td>Activity Code 3</td>
</tr>
<tr>
<td>The use of a modern water immersion microscope lens was tested.</td>
<td>Activity Code 4</td>
</tr>
<tr>
<td>Evaluation of samples comprised of bacteria imbedded in epoxy resin was performed. Prospects of integrated super-resolution optical and electron microscopy are under study.</td>
<td>Activity Code 5</td>
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</tbody>
</table>

### Quarterly Activities/ Project Description

- Faculty

### Project Status

- Less than 50% completed

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<thead>
<tr>
<th>Total Federal Amount ARRA</th>
<th>3660.98</th>
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<tr>
<td>Funds Received/ Invoiced</td>
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<tr>
<td>Number of Jobs</td>
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<td>Description of Jobs Created</td>
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<td>Total Federal Amount of ARRA Expenditure</td>
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<tr>
<td>Total Federal ARRA Infrastructure Expenditure</td>
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<tr>
<td>Infrastructure Purpose and Rationale</td>
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### Infrastructure Contact

- **Name**
- **Email**
- **Phone**
- **Ext**
- **Street Address 1**
- **Street Address 2**
- **Street Address 3**
- **City**
- **State**
- **ZIP Code + 4**

### Primary Place of Performance

- **Address 1**: Department of Anatomy, Physiology and Pharmacology
- **Address 2**: 109 Greene Hall
- **City**: Auburn University
- **Country Code**: US
- **State**: AL
- **ZIP Code + 4**: 36849 - 0001
- **Congressional District**: 02

### Recipient Highly Compensated Officers

- **Prime Recipient Indication of Reporting Applicability**: No
- **Officer 1 Name**: Officer 3 Name
- **Officer 1 Compensation**: Officer 3 Compensation
- **Officer 2 Name**: Officer 4 Name
- **Officer 2 Compensation**: Officer 4 Compensation
- **Officer 3 Name**: Officer 5 Name
- **Officer 3 Compensation**: Officer 5 Compensation

### Report Audit Trail

- **Created By**: Cindy Selman
- **Date Created**: 07/06/2011 03:58 PM
- **Last Updated By**: Cindy Selman
- **Last Updated On**: 07/06/2011 03:58 PM