

Report Information

Award Type	Award Number	Prime DUNS	Calendar Year / Quarter	Final Report
Grant	0934860	066470972	2011 / 2	No

Award Recipient Information

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

Project / Award Information

Funding Agency Code 4900	Total Number of Sub Awards less than \$25,000/award 0
Awarding Agency Code 4900	Total Amount Sub Awards less than \$25,000/award 0.00
Program Source (TAS) Code 49-0101	Total Number of Sub Awards to Individuals 0
Sub Account Number for Program Source	Total Amount of Sub Awards to Individuals 0.00
CFDA Number 47.082	Total Number of Payments to Vendors less than \$25,000/award 9
Amount of Award 287553.00	Total Amount of Payments to Vendors less than \$25,000/award 1212.33
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	

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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.

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Project Information	
<p>Project Name or Project/ Program Title</p> <p>Quarterly Activities/ Project Description</p>	<p>High-speed Super-Resolution Light Microscopy for 3D Imaging of Living Cells</p> <p>Computational algorithms for super-resolution image reconstruction were designed with initial implementation as MatLab software computer codes.</p> <p>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.</p> <p>The use of a modern water immersion microscope lens was tested.</p> <p>Evaluation of samples comprised of bacteria imbedded in epoxy resin was performed. Prospects of integrated super-resolution optical and electron microscopy are under study.</p>
	<p>Activity Codes (NAICS or NTEE-NPC) (up to 10)</p> <p>Activity Code 1 B43 - NTEE</p> <p>Activity Code 2</p> <p>Activity Code 3</p> <p>Activity Code 4</p> <p>Activity Code 5</p> <p>Activity Code 6</p> <p>Activity Code 7</p> <p>Activity Code 8</p> <p>Activity Code 9</p> <p>Activity Code 10</p>
	<p>Project Status Less than 50% completed</p> <p>Total Federal Amount ARRA Funds Received/ Invoiced 3660.98</p> <p>Number of Jobs 0.03</p> <p>Description of Jobs Created Faculty</p> <p>Total Federal Amount of ARRA Expenditure 5005.93</p> <p>Total Federal ARRA Infrastructure Expenditure 0.00</p> <p>Infrastructure Purpose and Rationale</p>

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Infrastructure Contact

Name	Street Address 1
Email	Street Address 2
Phone	Street Address 3
Ext	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 3 Name
Officer 1 Name		Officer 3 Compensation
Officer 1 Compensation		Officer 4 Name
Officer 2 Name		Officer 4 Compensation
Officer 2 Compensation		Officer 5 Name
		Officer 5 Compensation

Report Audit Trail

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