

Report Information				
Award Type	Award Number	Prime DUNS	Calendar Year / Quarter	Final Report
Grant	0934860	066470972	2010 / 4	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		
Project Name or Project/ Program Title	High-speed Super-Resolution Light Microscopy for 3D Imaging of Living Cells	Activity Codes (NAICS or NTEE-NPC) (up to 10)
Quarterly Activities/ Project Description	Developed the principle and theory for super-resolution linear and nonlinear microscopy methods based on the discrete illumination patterns. Designed a novel illumination system to fluorescent microscope based on a fast computer controlled micro-mirror array. Established the test patterns for reflection and fluorescent modes. Tested experimentally the super-resolution capability.	Activity Code 1 B43 - NTEE Activity Code 2 Activity Code 3 Activity Code 4 Activity Code 5 Activity Code 6 Activity Code 7 Activity Code 8 Activity Code 9 Activity Code 10
Project Status	Less than 50% completed	
Total Federal Amount ARRA Funds Received/ Invoiced	2225.23	
Number of Jobs	0.00	
Description of Jobs Created	No jobs to report this quarter	
Total Federal Amount of ARRA Expenditure	2225.23	
Total Federal ARRA Infrastructure Expenditure	0.00	
Infrastructure Purpose and Rationale		

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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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