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					19b. TELEPHONE NUMBER
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RPPR Final Report
as of 05-Nov-2018

Agency Code:

Proposal Number: 66928ELRIP **Agreement Number: W911NF-15-1-0340**

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Report Date: 31-Mar-2017 Date Received: 04-Nov-2018
Final Report for Period Beginning 15-Aug-2015 and Ending 31-Dec-2016

Title: Acquisition of Ultrafast Laser and Associated Instrumentation

Begin Performance Period: 15-Aug-2015 **End Performance Period:** 31-Dec-2016
Report Term: 0-Other

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

STEM Degrees: 2 **STEM Participants:**

Major Goals: This is a DURIP proposal to acquire an ultrafast laser system (UFLS) with associated instrumentation for measuring ultrafast dynamics of semiconductor nanomaterials in a wide range of wavelengths with high spatial resolution. The UFLS consists of two key components: an ultrafast amplifier (Spirit-1040-4 from Newport Corporation) and an optical parametric amplifier (Spirit-OPA). Acquisition of the proposed instrumentation has enabled many new methods of characterizations and greatly enhanced our overall capabilities for future programs in developing nanoscale lasers and plasmonic-enhanced devices such as ultrafast nanolasers and detectors. The expanded nanophotonic capabilities also enables research-related education by serving as a state-of-the-art platform for the training of graduate and undergraduate students.

Accomplishments: We have purchased the proposed laser system. The system has been installed at Arizona State University. The system was tested initially with some technical issues encountered and eventually resolved. The system has been running successfully at ASU. The system has been used for new experiments.

The system contains following important components. The specifics of the system are described in the following:

SPIRIT 1040-16
SPIRIT Flexible, Compact, High Power Ultrafast Laser: A compact, sealed, monolithic DPSS Yb femtosecond oscillator incl. built-in power attenuator and pulse selector to enable burst-modeand external triggering, and a closed-loop chiller for temperature stabilization.

SPECIFICATIONS
· Average power,1040 nm:> 16 W
· Pulse duration:< 400 fs
· Pulse repetition rate:Single shot – 1 MHz
· Spatial Mode:TEM00, M2 <1.2

NS-SPIRIT

Spirit-NOPA-F, Hybrid NOPA:
Tuning Range: 650-900nm & 1200-2500nm
Conv. Efficiency: >10% S+I at peak
Compressed Pulse Duration: 25-70fs @ 650-900nm

Compressed Pulse Duration: 40-100fs @ 1200-2000nm
Compressor Transmission: 50-70% @ 650-900nm
Compressor Transmission: 70-80% @ 1200-2000nm

SPIRIT-NOPA-3H
Spirit-NOPA automated Non-collinear OPA, Signal tuning range 500-800nm. The Spirit-NOPA is an automated Non-collinear Optical Parametric Amplifier (NOPA) specifically built and optimized for the Spirit™ultrafast laser. The turn-key, high repetition rate Spirit femtosecond laser combines with the Spirit-NOPA to create a powerful, user-friendly tunable source of ultrashort pulses for high repetition rate ultrafast applications. The Spirit-NOPA-3H is to be pumped with either a Spirit 1040-4, Spirit 1040-8 or Spirit 1040-16 (limited to 10 W input power).

The original government funding of $210,986.00 has been completely spent on the system. In addition, ASU has contributed additional funding to complete the laser system and additional components to work with the laser system.

Training Opportunities: Nothing to Report

Results Dissemination: Nothing to Report

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

PARTICIPANTS:

Participant Type: PD/PI
Participant: Cun-Zheng Ning
Person Months Worked: 1.00 **Funding Support:**
Project Contribution:
International Collaboration:
International Travel:
National Academy Member: N
Other Collaborators:

Final Report on proposal titled **“Acquisition of Ultrafast Laser and Associated Instrumentation”**

Principal Investigator: Cun-Zheng Ning, (480) 965-7421, e-mail: cning@asu.edu

ARO Grants Officer's Representative: Dr. Michael Gerhold, (919) 549-4357, e-mail: michael.d.gerhold.civ@mail.mil

AWARD AMOUNT: $210,986.00 (Contract no: W911NF-15-1-0340)

Objectives

This is a DURIP proposal to acquire an ultrafast laser system (UFLS) with associated instrumentation for measuring ultrafast dynamics of semiconductor nanomaterials in a wide range of wavelengths with high spatial resolution. The UFLS consists of two key components: an ultrafast amplifier (Spirit-1040-4 from Newport Corporation) and an optical parametric amplifier (Spirit-OPA). Acquisition of the proposed instrumentation has enabled many new methods of characterizations and greatly enhanced our overall capabilities for future programs in developing nanoscale lasers and plasmonic-enhanced devices such as ultrafast nanolasers and detectors. The expanded nanophotonic capabilities also enables research-related education by serving as a state-of-the-art platform for the training of graduate and undergraduate students.

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