

# Notice of Intent, New Unit of Administration, Research or Public Service

**Campus:** University of Illinois at Chicago

**Title of Unit:** Center for Advanced Design, Research, and Exploration (CADRE)

**Type of Proposed Unit:** Center  
(Choose from: Center, Department, College, Other)

**Region\*:** 10 - Chicago

**Zip Code of Proposed Location:** 60612

**Requested CIP Code\*\*:** 90.2901

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\*Map: <http://www.ibhe.state.il.us/Academic%20Affairs/Applications/public/materials/CRegionMap>

\*\*CIP 2010: <http://nces.ed.gov/ipeds/cipcode/>

**1. Unit Objectives and Contributions**

Describe specific objectives and measurable contributions the unit will make to the university's mission, paying particular attention to the unit's consistency with the university's focus statement and priorities. Is the unit to be involved in instruction and, if so, to what extent?

The mission of the Center for Advanced Design, Research, and Exploration is promote research, innovation, and development at UIC by providing strategic collaborations, technical expertise, and project management in the areas of national security, global health, and disaster preparedness. CADRE received temporary designation as a center from the Illinois Board of Higher Education in 2008. It continues to identify UIC-based research programs of interest to government agencies, integrate programs throughout the University of Illinois system, and foster collaboration with industry, the City of Chicago, the State of Illinois, and the United States federal government.

The goal of CADRE is to become a UIC resource for creating new technology through *advanced design*, expanding knowledge through basic, applied and translational *research*, and discovering new innovations through scientific *exploration* in the following critical areas:

- Data and Information Analysis
- Directed Energy
- Disaster Medicine, Field Triage and Evacuation
- Emergency Preparedness
- Health Informatics
- Human Systems Integration
- Miniaturization and Prototyping
- Public Policy and Strategy
- Robotics
- Threat Identification and Mitigation

CADRE's mission completely supports the mission of UIC in the following ways:

***“To create knowledge that transforms our views of the world and, through sharing and application, transforms the world.”***

CADRE was established in direct response to the needs of the federal government and other entities in the area of military health, population health, and homeland security. A deep understanding of public policy, current events, and present technology can shape the research community and lead to the most timely, relevant scientific outcomes. The philosophy that inspired CADRE focuses heavily on encouraging the creative combination of commercial products and cutting edge research to solve real-world problems in the near- and long-term. CADRE manages a range of research programs to encourage improved capabilities in detection, protection, and response. Since its inception, CADRE has worked with academic, government, and industry institutions nationwide to further the innovation and adoption of military and emergency response medical technology.

***“To address the challenges and opportunities facing not only Chicago but all Great Cities of the 21st century, as expressed by our Great Cities Commitment.”***

The City of Chicago is one of the most prominent cities in the nation in terms of population, business interests (insurance, banking, stock market, etc.), transportation, and leisure activities. Chicago is a natural target for terrorism, and its geography and industrial diversity contribute to

the likelihood of natural and technical/industrial disasters. UIC is located just two miles from the city center and is in an exceptionally vulnerable position in the event of a downtown. As such, UIC recognizes that it has a role to play in many aspects of homeland security. UIC also appreciates that such initiatives require the collaboration of many different disciplines on campus and with private industry, other academic institutions, and government agencies.

As the Chicago area's largest university, UIC has a responsibility and unique opportunity to contribute to the wellbeing of urban life, as embodied in its Great Cities Commitment – conducting and supporting engaged, interdisciplinary, high-impact research and partnerships that address key urban issues on a local and global scale. Similarly, CADRE will contribute to the emergence of Chicago as a global urban center, through its on-going research programs with the local and federal government.

In addition, CADRE will explore numerous public policy efforts relating to the City of Chicago and the State of Illinois. CADRE sees Chicago as a unique test bed for studying the complex interrelationships among science, engineering, and policy issues (e.g., transportation, infrastructure, and the security environment).

***“To foster scholarship and practices that reflect and respond to the increasing diversity of the U.S. in a rapidly globalizing world.”***

In light of increasing diversity and globalization, the need to understand implications on our country is becoming more critical. CADRE encourages collaboration across disciplinary, organizational, and geographical barriers; by blending the efforts of physical and social sciences, we believe that research products will be more robust and relevant to a rapidly changing world. Overall, the outcomes of CADRE programs will affect many populations as technology, procedures, and policies are shared across the civilian and military communities.

<b>2. Need</b>
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Explain how the unit will meet regional and state needs and priorities. What is the demand for the unit's services? What clients or population will the unit serve?
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(Note: Typically, in this section, proposals address the IBHE Public Agenda Goals. See last page of application.)

A central repository of expertise in homeland security, particularly in the medical response associated with security threats, will bolster the standing of UIC as an urban research and policy leader. CADRE will provide guidance in the potential applications of basic and clinical research to homeland security, federal and military needs by providing insight to previously funded research, current government capabilities, and political considerations for specific agencies. CADRE will also strengthen current relationships with federal agencies, such as the Department of Defense (DoD), by identifying and coordinating interdisciplinary research that is relevant to current needs of specific agencies. CADRE will leverage UIC's access to the Illinois Medical District and Chicago's status as an urban center to attract homeland security research funding and create research programs with widely generalizable results.

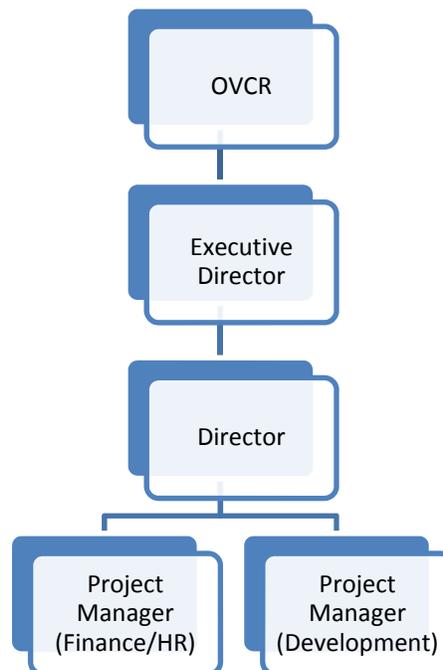
CADRE will also provide expertise in funding mechanisms beyond traditional grants; through multiple awards via broad area announcements, staff members have gained valuable experience in proposal writing and contract negotiation specific to the DoD. This experience also translates to

management practices that are consistent with both UIC and federal agency expectations and will ease the administrative burden of participating in contracts and cooperative agreements for investigators.

### 3. Organization

Describe the proposed unit's organizational structure. Explain how the unit is organized to meet its stated objectives.

The Organizational Chart below illustrates CADRE's administrative structure.



CADRE is a campus-wide unit that reports directly to the Vice Chancellor for Research at UIC. CADRE consists of a small permanent staff that is augmented by research scientists from several UIC colleges and schools. The Executive Director reports to the UIC Vice Chancellor for Research. The Executive Director establishes Center-wide research priorities and develops relationships with internal and external stakeholders that advance CADRE's mission. The Director is responsible for executing the research priorities by identifying appropriate funding opportunities, recruiting research teams, and leading proposal development efforts. The Director also assists with contract negotiation if an award is made. The Project Manager for Finance/HR supports the Director by providing budget and cost proposals during proposal development, and managing the budget and HR post-award. The Project Manager for Development supports the Director by continually identifying new funding opportunities, assisting with proposal submissions, and managing the project schedule post-award. Project coordinators may be added on a project-by-project basis to augment the core staff.

**4. Unit Outcomes**

What targets have been set to assess the proposed unit’s success in achieving objectives? Among others, specific performance measures might include: expected research and/or public service products; ratio of external to internal funding for unit; impact of this unit on national, state, regional, and local area organizations, businesses, or communities; and collaborative research product that promotes the Illinois economy.

To assess the unit’s success in achieving our stated objectives, CADRE focuses on maintaining and further developing research products; specifically:

1. Managing Large-scale, multidisciplinary research programs:
  - To date, CADRE has successfully obtained approximately \$42M in extramural funding (full list provided below).
  - CADRE actively pursues opportunities that provide at least \$1M in total funding.
2. Leading cross-unit proposal development efforts:
  - CADRE has submitted over 25 proposals that combine at least 2 independent academic units.
  - Many proposals also include small business partners or other academic institutions.
3. Publishing research outcomes:
  - CADRE programs have produced 24 peer-reviewed publications (See Appendix A)

Below is a list of current and past research projects in which CADRE has played a central role.

Current Projects	Details	Duration	Amount
<b>Non-Invasive Detection of Unique Molecular Signatures in Laser-Induced Retinal Injuries</b>	<b>UIC:</b> CADRE  <b>Partners:</b> Summa Health System, Akron, OH; Johns Hopkins University, Baltimore, MD; NASA Glenn Research Center, Cleveland, OH; AFRL Wright Research Site, Dayton, OH	1/2013 - 1/2016	\$2.6 M
<b>Illinois Manufacturing Excellence Center</b>	<b>UIC:</b> CADRE  <b>Partners:</b> Illinois Manufacturing Excellence Center	7/2010 - 9/2015	\$11 M
<b>Illinois Manufacturing Excellence Center - Biotech Pharma Survey</b>	<b>UIC:</b> CADRE  <b>Partners:</b> Illinois Manufacturing Excellence Center	10/2013 - 9/2014	\$300k

Past Projects	Details	Duration	Amount
<b>Continued Development of the AF/SGR "Tricorder" Program for Homeland Security, Military, Public Health &amp; Medical Operations (Shortname: Tricorder/LEP Program)</b>	<b>UIC:</b> CADRE; Biomedical & Health Information Sciences; Chemistry; Biological Sciences; Research Resources Center; Electrical & Computer Engineering  <b>Partners:</b> Sensing Strategies, Inc., Pennington, NJ; Summa Health System; Akron, OH, Illinois Institute of Technology; Chicago, IL; Wright Patterson Air Force Research Laboratory; Dayton, OH	<b>Four years:</b> 10/2009 - 3/2012	\$15.4 M
<b>Continued Development of the AF/SGR "Tricorder" Program for Homeland Security, Military, Public Health &amp; Medical Operations (Shortname: Active Tricorder)</b>	<b>UIC:</b> CADRE; Biomedical & Health Information Sciences; and Electrical & Computer Engineering  <b>Partners:</b> Sensing Strategies, Inc., Pennington, NJ  <b>Funded by:</b> Representative Danny K. Davis, D-IL, 7th District	<b>Two years:</b> 10/2009 - 5/2012	\$1.0 M Federal Appropriation
<b>Biomarkers and Laser Eye-Protection for Homeland Security &amp; Military Operations</b>	<b>UIC:</b> Chemistry; Biomedical & Health Information Sciences; Ophthalmology  <b>Partners:</b> Summa Health Systems, Akron, OH  <b>Funded by:</b> Senator Richard J. Durbin, D-IL; Senator Dan Inouye, D-HI	<b>Three years:</b> 9/2005 - 10/2008	\$ 5.0 M Federal Appropriation
<b>Continued Development of Biomarker Detection Following Laser-Induced Retinal &amp; Other Tissue Injury in the Primate (Shortname: Primate Biomarkers)</b>	<b>UIC:</b> CADRE; Ophthalmology  <b>Partner:</b> SUMMA Health Systems, Akron, OH	<b>Two years:</b> 10/2007 - 9/2010	\$1.8 M
<b>Laser Emitting Diode for Stabilization of Cutaneous Battlefield Wounds for Air Evacuation &amp; Transport (Short name: LED MedPen)</b>	<b>UIC:</b> CADRE; Dentistry; Software Technologies Research Center (STRC); UIC Altitude Chambers  <b>Partner:</b> Kirtland Air Force Base, Albuquerque, NM; Lockheed Martin Aculight Corporation, Bothell, WA	<b>Two years:</b> 10/2009 - 11/2011	\$2.4 M Federal Appropriation

	<b>Funded by:</b> Senator Richard J. Durbin, D-IL; Senator Barack H. Obama, D-IL		
<b>Research, Analysis &amp; Databasing of Emerging High Power Directed Energy Technologies Marketed to the Clinical &amp; Research Communities</b>	<b>UIC:</b> CADRE; Public Health; Biomedical & Health Informatics; Dentistry; Software Technologies Research Center (STRC)	<b>Five years:</b> 10/2009 - 9/2014	\$12.1 M

### 5. Quality Assurance Processes

Briefly describe the processes that will yield evidence to demonstrate the quality of the unit. Address the following elements: evidence that the unit supports the university's mission and statewide goals; evidence that the unit's product or outcomes achieve stated objectives; determination of organizational effectiveness; faculty and staff qualifications and reward structures; determination of adequate support staff, equipment, and other resources; and use of results from evaluations to improve the unit's effectiveness.

#### University Mission and Statewide Goals:

Continued support for the development and funding of multidisciplinary research programs.

Strategic focus areas include:

- Cross-unit collaborations within UIC
- UIC investigator/Private sector collaborations
- UIC investigator/DoD research laboratory collaborations
- UIC investigator/Federal research laboratory collaborations

Evidence outcomes achieve stated objectives:

- Increased extramural funding for multidisciplinary research projects
- Increased proposal submission for large projects (>\$1M)
- Increased new collaborations across professional backgrounds
- New and diverse relationships with DoD leadership and program managers

#### Determination of organizational effectiveness:

- Obtain sufficient funding to remain self-sustaining
- Improved ratio of submitted to funded proposals
- Repeat collaborations

#### Faculty and staff qualifications and reward structures:

Qualifications:

The Executive Director and Director both hold doctorates and are experienced in proposal development and research administration. CADRE's Executive Director, Larry Danziger, PharmD, has served on UIC's faculty for over 25 years. Dr. Danziger was the UIC Interim Vice Chancellor for Research from 2008-2010; prior to that appointment, he held the position of Associate Vice Chancellor for Research from 1999 to 2007 and was responsible for most of the day-to-day operations of the

Office of the Vice Chancellor for Research, including research compliance, sponsored research project administration, human subjects and animal care protection and conflict of interest and commitment. Dr. Danziger also served as chair of the University of Illinois at Chicago Human Subject Investigation Research Board from 1995-1999. CADRE's Director, Melissa Naiman, PhD, has been a member of CADRE since 2007 and has led the development and management of CADRE's research portfolio. Dr. Naiman has continuously maintained a Project Management Professional (PMP) Certification since 2008 and was a licensed and Nationally Registered Emergency Medical Technician-Basic from 2006-2008.

Project Managers are required to have a bachelor's degree in a scientific, management, or related field. A Master's degree is preferred. Project Managers also have experience with university financial management systems, such as Banner, Eddie, etc.

**Reward Structures:**

Performance is rewarded through annual merit-based raises (when permitted by University policy), support for professional development (such as conference registration fees and tuition for advanced management training/seminars), and flexible scheduling to accommodate ongoing formal training. Performance reviews are completed annually and professional development plans are reviewed and updated every 6 months. Professional development plans allow each member of the Center to identify areas in which they would like to develop or improve skills and partner with Center leadership to create opportunities for advancement.

<b>6. Resources</b>
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Indicate the number of students, businesses, industries, and/or other clients to be served by this unit. Include a description of faculty participation and student involvement in the unit if applicable. Provide a narrative budget statement explain the data in the attached Budget Table.
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Students:

Though training students is not part of CADRE's mission, students are supported through research sponsored by programs CADRE manages. To date, CADRE programs have supported approximately 12 graduate students and postdoctoral scholars in Chemistry, Biology, Engineering, Applied Health Sciences, Public Health, and Dentistry.

Businesses:

CADRE has partnered with one small business during two separate research efforts. CADRE is focusing on the development of STTRs as part of its next phase of growth. To that end, CADRE has partnered with Advanced Cooling Therapy (ACT), a medical device start-up housed in the Illinois Institute of Technology University Technology Park to submit an STTR to NIH for the April cycle. CADRE plans to support a second project with ACT for the August submission date and is actively seeking additional partners through the Incubator Laboratory Facility.

Industry:

CADRE currently partners with the Illinois Manufacturing Excellence Center (IMEC). IMEC provides manufacturing improvement specialists to improve the productivity and competitiveness of Illinois' small and mid-sized firms. CADRE is also engaged in a research project to help IMEC expand its offerings to the biotechnology sector.

Faculty Participation: Faculty members participate in CADRE as principal investigators on sponsored projects.

Estimated Expenditures of Extramural Funding for Proposed Unit						
Illinois Higher Education						
	FY08	FY09	FY10	FY11	FY12	FY13
<b>Expenditures</b>						
Personnel						
Faculty Count	2	2	2	2	1	1
Personal Services	\$585,469	\$537,737	\$721,519	\$940,294	\$969,841	\$885,457
Other Personnel Expenditures	\$147,629	\$199,354	\$313,569	\$445,482	\$300,638	\$261,154
Supplies, Services, Equipment	\$335,226	\$2,041,784	\$2,876,038	\$2,297,963	\$1,209,152	\$26,917
Facilities	\$506,898	\$42,045	\$627,098	\$583,462	\$207,267	\$131,739
<b>Total Expenditures</b>	<b>\$1,575,223</b>	<b>\$2,820,921</b>	<b>\$4,538,224</b>	<b>\$4,267,201</b>	<b>\$2,686,899</b>	<b>\$1,305,267</b>

- The current budget is adequate to support the Center, no new resources are required and no state funds are being requested.
- Currently, the faculty of CADRE is able to meet the research goals of the Center. Due to CADRE's business model, on-going increased workload will be associated with funded research proposals, which will provide adequate funding for additional staff members.
- The current staff levels are adequate to maintain the structure described above. Based on previous experience, project managers perform best when responsible for a maximum of 3-5 projects (depending on the complexity and scope of each product). As funding expands, additional project managers will be hired accordingly.
- CADRE's current office space and technology are adequate for current operations and will accommodate moderate expansion.
- To date, library resources have been adequate to support CADRE's efforts. CADRE faculty makes extensive use of inter-library loan when materials are not immediately available on campus or through electronic sources.
- CADRE has been self-sustaining through cooperative agreements and contracts since 2005. CADRE maintains an ICR reserve that provides bridge funding between projects, and staff levels fluctuate based on the number and complexity of funded projects at any given time.

Reference  
For Question 2  
Need

***The Illinois Public Agenda for College and Career Success***

Illinois Administrative Code: 1050.30(a)(6): A) *The unit of instruction, research or public service is educationally and economically justified based on the educational priorities and needs of the citizens of Illinois*

Demonstrate how the proposed program will support one or more goals of *The Illinois Public Agenda*, the Illinois Board of Higher Education's Strategic Initiative. Each program does not have to contribute to every goal, but it must contribute to at least one.

(For more information about each of the four goals of *The Illinois Public Agenda*, go to the IBHE website: [http://www.ibhe.org/masterPlanning/materials/070109\\_PublicAgenda.pdf](http://www.ibhe.org/masterPlanning/materials/070109_PublicAgenda.pdf))

Goal 1. *EDUCATIONAL ATTAINMENT*. – Increase educational attainment to match the best-performing states.

Goal 2. *COLLEGE AFFORDABILITY*. – Ensure college affordability for students, families, and taxpayers.

Goal 3. *HIGH QUALITY CREDENTIALS TO MEET ECONOMIC DEMAND*. - Increase the number of high-quality post-secondary credentials to meet the demands of the economy and an increasingly global society.

Goal 4. *INTEGRATION OF EDUCATIONAL, RESEARCH, & INNOVATION ASSETS*. – Better integrate Illinois' educational, research, and innovation assets to meet economic needs of the state and its regions.

## Publications Generated from CADRE Programs

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1. Asunskis DJ, Bolotin IL, Haley JE, Urbas A, Hanley L. Effects of Surface Chemistry on Nonlinear Absorption of PbS Nanocrystals. *J Phys Chem C*. 2009 Nov;113(46):19824-9.
2. Asunskis DJ, Bolotin IL, Hanley L. Nonlinear optical properties of PbS nanocrystals grown in polymer solutions. *J Phys Chem C*. 2008 Jul;112(26):9555-8.
3. Asunskis DJ, Bolotin IL, Wroble AT, Zachary AM, Hanley L. Lead sulfide nanocrystal-polymer composites for optoelectronic applications. *Macromol Symp*. 2008;268:33-7.
4. Asunskis DJ, Hanley L. Valence band and core level X-ray photoelectron spectroscopy of lead sulfide nanoparticle-polymer composites. *Surf Sci*. 2007 Oct;601(19):4648-56.
5. Bishnoi SW, Lin Y-j, Tibudan M, et al. SERS Biodetection Using Gold-Silica Nanoshells and Nitrocellulose Membranes. *Analytical Chemistry*. 2011 04/19-2013/06/04;83(11):4053-60.
6. Bolotin IL, Asunskis DJ, Jawaid AM, Liu Y, Snee PT, Hanley L. Effects of surface chemistry and shape on nonlinear absorption, scattering, and refraction of PbSe nanocrystals. *Proceedings of SPIE*. 2011;7935:79350P/1-P/7.
7. Bolotin IL, Asunskis DJ, Jawaid AM, Liu YM, Snee PT, Hanley L. Effects of Surface Chemistry on Nonlinear Absorption, Scattering, and Refraction of PbSe and PbS Nanocrystals. *J Phys Chem C*. 2010 Oct;114(39):16257-62.
8. Boyd AD, Naiman M, Preston R, Stevenson G, Valenta AL. Portable Devices to Detect Directed Energy: User Perceptions of Personal Risk and Protective Devices. *IJCMAM*. 2010:1.
9. Boyd AD, Naiman M, Stevenson GW, Preston R, Valenta AL. Technical and Operational Users Opinions of a Handheld Device to Detect Directed Energy. *AviatSpace EnvironMed*. 2013;84(5):528-33.
10. Brenneman K, Sen B, Stroschio MA, Dutta M. Aptamer-based optical bionano sensor for mercury(II) ions. *Nanotechnology Materials and Devices Conference (NMDC), 2010 IEEE*. Monterey, CA, USA; 2010. p. 221-4.
11. Colvard MD, Naiman M, Danziger L, Hanley L. Handheld directed energy sensor for environmental monitoring and clinician safety. *AviatSpace EnvironMed*. 2010 Jun;81(6):602.
12. Dunmire JJ, Bouhenni R, Hart ML, et al. Novel serum proteomic signatures in a non-human primate model of retinal injury. *Mol Vis*. 2011;17:779-91.
13. Hanley L, Bolotin IL, Asunskis DJ, Wroble AT, Zachary AM, inventors; The Board of Trustees of the University of Illinois, USA . assignee. All-gaseous deposition of nanocomposite films patent WO2008108809A2. 2008.

14. Kierny MR, Cunningham TD, Kay BK. Detection of biomarkers using recombinant antibodies coupled to nanostructured platforms. *Nano Rev.* 2012;3.
15. Liu Y, Penczak JS, Gordon RJ. Nanosecond polarization-resolved laser-induced breakdown spectroscopy. *Opt Lett.* 2010;35(2):112-4.
16. Liu Y, Singha S, Witt TE, Cheng Y, Gordon RJ. Observation of near total polarization in the ultrafast laser ablation of Si. *Applied Physics Letters.* 2008;93(16):161502-3.
17. Penczak JS, Liu Y, Gordon RJ. Polarization Resolved Laser-Induced Breakdown Spectroscopy of Al. *The Journal of Physical Chemistry A.* 2009;113(47):13310-7.
18. Penczak JS, Liu Y, Gordon RJ. Polarization and fluence dependence of the polarized emission in nanosecond laser-induced breakdown spectroscopy. *Spectrochimica Acta Part B: Atomic Spectroscopy.* 2011;66(2):186-8.
19. Penczak JS, Liu YM, Schaller RD, Rich DH, Gordon RJ. The mechanism for continuum polarization in laser induced breakdown spectroscopy of Si(111). *Spectrochimica Acta Part B: Atomic Spectroscopy.* 2012;(accepted for publication).
20. Scott SE, Bouhenni RA, Chomyk AM, et al. Anti-Retinal Antibodies in Serum of Laser-Treated Rabbits. *Investigative Ophthalmology & Visual Science.* 2012 April 1, 2012;53(4):1764-72.
21. Singha S, Hu Z, Gordon RJ. Ablation and plasma emission produced by dual femtosecond laser pulses. *Journal of Applied Physics.* 2008;104(11):113520.
22. Singha S, Hu Z, Gordon RJ. Closed Loop Coherent Control of Electronic Transitions in Gallium Arsenide. *The Journal of Physical Chemistry A.* 2011 02/22-2012/04/12;115(23):6093-101.
23. Stevenson G, Naiman M, Boyd A, Valenta AL. *Cursor on Target: Research for a Sensor Network;* 2012.
24. Zhao Y, Singha S, Liu Y, Gordon RJ. Polarization-resolved laser-induced breakdown spectroscopy. *Opt Lett.* 2009;34(4):494-6.