OMB No. 0925-0001 and 0925-0002 (Rev. 09/17 Approved Through 03/31/2020)

 BIOGRAPHICAL SKETCH

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NAME: David E. Peaslee

eRA COMMONS USER NAME (credential, e.g., agency login): DPEASLEE

POSITION TITLE: Physicist, Metrology Engineering

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

| INSTITUTION AND LOCATION | DEGREE(if applicable) | Completion DateMM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| University of Missouri, St. Louis, MO | BA/BS | 12/2006 | Mathematics/ Physics |
| University of Missouri, St. Louis, MO | MS | 08/2008 | Physics |
| University of Missouri, St. Louis, MO | MS | 05/2012 | Mathematics |
| Missouri University of Science and Technology, Rolla, MO | PHD | 12/2013 | Physics |
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# A. Personal Statement

As a new researcher, I am eagerly looking forward to working on this project. Since joining SPEC Sensors in October of 2014, I have developed a keen understanding of how our gas sensor development can greatly influence the understanding of our surroundings and environment. While working with electrochemical sensors and their necessary electronics, I have strived to identify and overcome their limitations. While previously these small sensors were intended for identifying high concentrations of toxic air contamination, we have designed and characterized these electrochemical sensors to monitor and measure ambient levels in the atmosphere. These advances will have a direct impact on an individual’s ability to monitor their air quality and to reduce the amount of air pollution to which they are exposed.

I first became involved in electrochemical modeling during my pre and post-doctoral work on double layer supercapacitors. With my math and physics background, I have made advances on modeling and correcting the effects of temperature and humidity, to bring the sensitivity of our sensors from the parts-per-million range, to the parts per-billion-range. While previously studying novel materials for the electrodes and electrolytes of supercapacitors, I have been able to transfer this knowledge of materials into the electrochemical gas sensor design. Working with ionic liquids and ionic gels at NASA Ames, I have a great understanding of their potential to expand gas sensing into previously unreachable areas, such as extreme dry, hot, or cold environments.

While working at SPEC sensors, I have worked on various projects and patents, including the wireless/powerless gas sensing and novel personal gas sensing apparatus listed below:

1. J. R. Stetter, V. Patel, B. Meulendyk, M. Papageorge, D. Peaslee, G. O’Toole, “Electronic Device Covers Having Gas Sensors,” US 2016/0189520 A1 published Jun. 30 2016.
2. J. R. Stetter, D. Peaslee, “WIRELESS NEAR-FIELD GAS SENSOR SYSTEM AND METHODS OF MANUFACTURING THE SAME,” US 10,241,073 B2 granted Mar. 26, 2019.

# B. Positions and Honors

## Positions and Employment

2007–2009 Supervisor for Undergraduate Physics Labs, University of Missouri, St. Louis, MO

2007–2011 Researcher, Majzoub Research Group, University of Missouri, St. Louis, MO

2011-2013 Intern, Applied Space Science Technology Group, NASA - Ames Research Center, CA

2011-2013 Fellow, NASA Harriett G. Jenkins Predoctoral Fellowship Project, St. Louis, MO

2014-2015 Industrial Post Doc, SPEC Sensors, Newark, CA

2015- Physicist, Metrology Engineering, SPEC Sensors, Newark, CA

2019- Visiting Research Scientist, University of Missouri – St. Louis

## Other Experience and Professional Memberships

2005- Member, Sigma Xi Scientific Research Society

2007-2009 Student Member, American Association of Physics Teachers

## Honors

2007-2011 Graduate Research Fellowships from the NASA-Missouri Space Grant Consortium

2013 Nominated as a 2014 Cohort VI NASA Student Ambassador

2017 Project selected as a finalist in Motorola’s “Transform the Smartphone Challenge”

# C. Contribution to Science

1. My initial publications stemmed from my graduate research in physics at the University of Missouri. My dissertation focused on hydrogen storage materials, specifically their characterization and synthesis. These materials were formed from carbonized polymers, and were intended for the physical storage of metal hydrides in their nano-porous structures. The bulk of the work I did focused on designing a system intended for characterizing the hydrogen storage capacity of the materials. This system included extensive electrical and systems engineering, as it consisted of a temperature controlled ultra-high vacuum chamber and a mass spectrometer residual gas analyzer. This was my first experience with gas sensing, although on a much larger scale. The system is still in use, and continues to provide insight on hydrogen storage materials.
	1. X. Liu, D. Peaslee, T. P. Sheehan, and E. H. Majzoub. (2014) “Decomposition Behavior of Eutectic LiBH4–Mg(BH4)2 and Its Confinement Effects in Ordered Nanoporous Carbon.” *The Journal of Physical Chemistry C.*
	2. X. Liu, E.H. Majzoub, and D. Peaslee. (2013). "Tailoring the hydrogen storage properties of Li4BN3H10 by confinement into highly ordered nanoporous carbon.” *Journal of Materials Chemistry A.*
	3. X. Liu, D. Peaslee, et al. (2011). "Systematic pore size effects of nanoconfinement of LiBH4: Elimination of diborane release and tunable behavior for hydrogen storage applications.” *Chemistry of Materials.*
	4. C.Z. Jost, X. Liu, E.H. Majzoub, and D. Peaslee.(2010).” Controlling the decomposition pathway of LiBH4 via confinement in highly-ordered nanoporous carbon.” *Journal of Physical Chemistry C.*
2. My work with electrochemical systems started with side projects in graduate school. It focused on nano-porous carbon capacitor electrodes with ionic liquid electrolytes. This work continued with a fellowship at NASA Ames research center where we worked on composite electrodes created with layered carbons and oxides with various ionic and basic electrolytes. The inclusion of ionic liquids as electrolytes led to advances in supercapacitor technology for low temperature applications. The experience here with electrochemical systems, and my graduate work with gas measurement both contribute greatly to the skills necessary to facilitate this project at SPEC Sensors.
	1. Ajayi, O. A., Guitierrez, D. H., Peaslee, D., Cheng, A., Gao, T., Wong, C. W., & Chen, B. (2015). “Electrophoretically deposited graphene oxide and carbon nanotube composite for electrochemical capacitors.” *Nanotechnology*, 26(41), 415203.
	2. Gutierrez, D. H., Peaslee, D., Tanaka, Z., Londono, N., Meyyapan, M., & Chen, B. (2013). “Ionic, Organic and Strong Electrolytes with Graphene on Metal Oxide Composite Electrodes for Supercapacitors.” *ECS Transactions*, 45(31), 1-11.
3. SPEC Sensors has a broad customer base from startups to large OEM manufacturing customers. While working with our customers on their projects, I have had the opportunity to help develop novel applications of sensors technology. From health indicators using breath detection, to developing personal monitors to study Ozone and asthma, our sensors have a broad field of applications. Recently I have been working on projects to develop unique wireless & powerless formaldehyde sensors using ionic liquid electrolytes combined with energy harvesting circuits. Additionally, many of our projects also involve a multi-sensor array for air quality monitoring, including compensation and filtering algorithms that I have developed. In the past two years, I have managed our company’s first three SBIR Phase I efforts as the principle investigator. These projects have led to a patent and our prototype formaldehyde sensor. For these recent projects, I have performed the majority of the engineering tasks including; electrical and mechanical design and fabrication, sensor characterization, firmware and software design, as well as necessary documentation and reporting.
	1. EPA SBIR Phase I for “Zero Power Electrochemical Formaldehyde Sensor with Novel Catalyst for Indoor Air Quality” (EPD17031, 2017)
	2. DOD Air Force SBIR Phase I for “Low-Cost Wearable Device for Total Environmental Health Monitoring” (FA8650-17-P-6891, 2017)
	3. Currently the PI for a DOE SBIR Phase I project for “Robust and Reliable Hydrogen Leak Detection and Warning Systems” (0000246170, 2019)

# D. Additional Information: Research Support

Professional Research includes projects that SPEC Sensors was contracted to perform. Such projects include a KWJ project: “Home Ozone Monitor Incorporating Low Cost High Performance Printed Gas Sensors,” NIH SBIR Phase II, Grant No. 2R44ES021676-02, 4/1/15 – 3/31/17 and a SPEC capital investment to commercialize wearable sensors.