DuPont Science & Technology
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September 28, 2015

Mark O'Brien
Staff Liaison, ACS Committee on Technicial Affairs
American Chemical Society
1155 Sixteenth Street NW
Washington, DC 20036
cta@acs.org

Dear Mr. O'Brien:

It is my pleasure to write in support of the nomination of Mr. Brian McCauley, Associate Investigator, for the 2015 NCTA, National Chemical Technician Award. Mr. McCauley joined DuPont's Corporate Center for Analytical Sciences (CCAS) within the Central Research and Development (CR&D) organization in December 2009. He works within the Macromolecule Characterization competency lab reporting to Dr. Yefim Brun. Brian received his BS degree at the Colorado School of Mines and worked for Waters and GE before joining DuPont.

DuPont was fortunate – when this lab had an opening for an associate investigator Brian sought us out. As a service engineer he saw that interesting and challenging work was being done in our lab and he wanted to be part of it; he has a true interest in science, understanding and applying it to solve complex problems.

In hiring Brian we recognized his strong skills in chromatography equipment; however, in the short time that he has been in the lab we quickly recognized that his skill sets are far more expansive. He is exceedingly innovative, thinking about how a problem can be solved and not allowing himself to be bogged down in the difficulties. As such he has driven expanding capability and especially high-throughput analysis using Size Exclusion Chromatography – a tool not easily made to get to data quickly! He has demonstrated this capability for more than one problem. Somehow Brian always finds a path to a workable solution.

Fortunately, Brian also is an extremely good communicator with a winning personality. He is able to rally people, work with all types people and lead them on a project. His colleagues and peers look to him for technical guidance and support whether it focuses on developing a new method or instrument trouble-shooting, Brian manages to make the time to help.

Because of his open minded attitude, willingness to step in and help and his exceptional ability to solve problems innovatively, Brian has helped to bridge a span between Associate Investigators and Principal Investigators winning praise and respect from both. I see him as a role model for and an excellent candidate for the National Chemical Technician Award.

Sincerely,

Alexa Dembek
Director of Central Research and Development

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September 24, 2015

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ACS Committee on Technician Affairs
American Chemical Society
1155 Sixteenth St. NW
Washington, DC 20036

RE: National Chemical Technician Award

To Whom It May Concern:

I am writing this letter on behalf of DuPont Industrial Biosciences to recommend Brian McCauley for the ACS National Chemical Technician Award. It is with great enthusiasm that I nominate Brian based upon the multitude of contributions that he has made to our organization while based in the DuPont Corporate Center for Analytical Sciences.

I first became aware of Brian in the summer of 2014, when a DuPont cross-business team was gearing up to analyze a massive collection of 28,000 polymer samples with the goal of identifying candidates that could be used to build a new materials platform. Brian not only led this highly complex, collaborative effort, but also developed the one-minute/sample size-exclusion chromatography analysis method that enabled the completion of this enormous task in only 10 days without incident.

This represented a significant step change compared to what was then current state-of-the-art technology. The success of Brian's team was made evident when > 95% of the "hits" identified in this high-throughput campaign were confirmed via a more extensive five-minute/sample analysis method also developed by Brian. These results came at a critical juncture for the project and enabled the project team of > 60 colleagues to achieve a crucial development milestone.

In addition to his efforts within the laboratory, Brian is also a valuable contributor to the overall DuPont community. He is often sought out by colleagues to answer questions and give technical guidance. Brian is particularly gifted in explaining scientific principles and presenting data to business team members, and often serves as a mentor for new employees.

As evidenced by the qualifications above, Brian McCauley is an exceptional candidate for the ACS National Chemical Technician Award. I fully support Brian's nomination and trust that you will give him careful consideration. Please feel free to contact me with questions or for further information.

Best Regards,

Michael Saltzberg
Business Development Director
DuPont Industrial Biosciences

National Chemical Technician Award Candidate Form

Candidate information

Name:	Brian McCauley	***Title:***	Associate Investigator
Company name:	DuPont		
Complete work address:	200 Powder Mill Road; P.O. Box 8352; E228/230A Wilmington, DE 19803		
Work phone:	302-695-3017	***Email:***	Brian.McCauley@dupont.com

Candidate's immediate supervisor's information

Supervisor's name:	Yefim Brun	***Supervisor's title:***	Technical Fellow
Work Phone:	302-695-4361	***Email:***	Yefim.Brun@dupont.com

Nominator's information

Nominator's name:	John Gavenonis	***Nominator's title:***	Technology Manager
Work Phone:	302-695-7821	***Email:***	John.Gavenonis@dupont.com

Candidate Eligibility

All three boxes in the Eligible column must be checked for candidate to be eligible.

	Eligible	***Ineligible***
1. Is the candidate a chemistry-based laboratory technician, process technician, operator, analyst, or other applied chemical technology professional?	☒ Yes	☐ No
2. Has the candidate been employed for at least five years as an applied chemical technology professional?	☒ Yes	☐ No
3. Is the candidate currently a member of the Committee on Technician Affairs Executive Board and/or Advocacy & Public Relations Subcommittee?	☒ No	☐ Yes

Candidate's contribution in six areas of award criteria

Make space as necessary under each category. Total packet, including letter(s) of recommendation. must not exceed 6 pages, minimum 10-point font. Do not include proprietary, confidential, or private information.

Technical Achievements (worth 60%)

Brian joined DuPont in 12/09 in the Corporate Center for Analytical Sciences (CCAS), Macromolecular Characterization (MMC) lab, which focuses on separation and characterization of complex macromolecules. As an ex-instrument service engineer, Brian was familiar with the type of work performed in labs doing Size Exclusion Chromatography (SEC). He felt that work in DuPont's lab was the most challenging and interesting he encountered in his service rounds and he wanted to be part of it. This is an indicator of Brian's drive; he seeks out challenges. While Brian joined the group with strength in instrumentation, he has since distinguished himself as an exceedingly innovative thinker and problem solver. Brian has demonstrated operational and intellectual excellence through his work on high throughput SEC analysis method development and his work to enhance and grow DuPont's interaction polymer chromatography capability.

New characterization challenges continue to emerge, including a need to rapidly characterize complex bio-based macromolecules. To address this challenge, Brian set out to develop a high throughput analysis method to support rapid characterization of these molecules. He explored multiple alternative analyses— 2 conventional methods as well as exploring 2 more exotic procedures - all failed to produce a useful high throughput method to distinguish macromolecules. Brian focused on developing a 1-minute, high throughput SEC method. This incredible effort reduced analysis time by 98%, from at least 1 hour of run time per analysis to 1 minute. The challenge was that the polymer requiring rapid separation has very limited solubility in conventional solvent systems. While systematically attempting to adapt commercially available high-speed SEC columns, Brian discovered a unique solubility characteristic for this polymer that

virtually eliminated the extensive time required for sample preparation. The sample preparation was optimized from an overnight process requiring elevated temperatures (not amenable to high-throughput sample preparation formats) to virtually instant solubility at room temperature under specific conditions common to all polymer candidates for this analysis.

Concurrently, the MMC lab was asked to beta-test a new SEC system. Brian recognized that this system had potential to significantly reduce analysis times. Typical SEC methods use high-volume separation columns to provide adequate polymer size resolution, with analysis times in excess of an hour per sample. In comparison, this system was designed to use different separation column geometry to maximize column efficiency. Brian improved the technology well beyond application expectations, establishing a 1-min/sample molecular weight screening method. Likewise, he developed a robust calibration and system suitability test, as well as automated data processing methods.

Brian worked closely with product development personnel to adapt this polymer's unique solubility characteristics to robotic high-throughput sample preparation. Using his sample preparation technique along with the 1-minute molecular weight (MW) screening allowed him to easily screen thousands of polymer candidates. After conducting rigorous method validation against an analogous conventional SEC method, a campaign of over 28,000 polymer candidates was planned. Brian coordinated system operator training, acquired the necessary consumables, coordinated facility logistics, as well as personnel scheduling for 24-hour operation to meet a 2-week analysis deadline. This analysis campaign was completed without issue and a full day ahead of schedule.

Success breeds success, this accomplishment was followed with a growing number of associated samples. Again, Brian recognized that speed and productivity would be a challenge to generating data that elucidated the structure of the complex macromolecular materials. To meet project milestones, Brian successfully modified a 1-hour/sample SEC "workhorse" method to provide equivalent MW distribution data in ~5 min/sample. This increased the lab's throughput and decreased analysis turn-around time to meet the high demand of multiple programs that were using structural data of this proprietary material.

These two examples were undertaken and completed within a six month timeframe. They are typical of Brian's technical prowess in the lab. His strong understanding of the physical-chemical aspects of separation, coupled with his extensive knowledge of equipment hardware, allow him to advance separation of complex macromolecular materials. He is a thoughtful and outstanding student of thermodynamics and solutions interactions, which he applies to advance changes in the lab. His understanding and commitment to drive to a solution has been noted not only by members of the lab, but also by members of project teams. As such, he has been invited to participate in many discussions with Principal Investigators within CCAS as well as our business research partners. One Principal Investigator commented, "Brian has regularly contributed his suggestions and ideas at relevant team meetings and in one-on-one interactions with members of the broader project team. Brian is a highly valued member of our team and we look forward to our continued collaboration with him (and the entire lab) during the upcoming year."

Brian has made a concerted effort to expand the lab team's knowledge in the realm of these specific complex macromolecules, current whole-molecule characterization methods, as well as finding applicable background information to help the lab develop understanding of these complex systems.

A complementary example of Brian's capability is his work on the core team that successfully developed an SEC method capable of analyzing and quantifying the low MW weight portions of carrageenan. Previously, this work was pursued for 12 years by an industrial consortium, Marinalg, with no success. The ability to measure the low MW portions helps any business that wishes to use carrageenan in food applications meet the EU regulatory requirements. As a member of the MMC team, Brian made vital contributions to this effort.

While the separation of complex macromolecules is challenging, detecting and characterizing the separated components is also crucial. Brian continues to lead efforts to develop and expand characterization methods and techniques new to the macromolecular characterization competency. These include multiple hyphenated detection systems including coupling a mass spectrometer detector to an SEC with routine multi-detector systems and developing and implementing temperature gradient Interactive Polymer Chromatography (IPC).

Other (Considered together to make up the remaining 40%)

Leadership/Mentoring (15%)

Brian's successful high throughput SEC analysis was needed to meet a substantial business challenge: screen ~9,000 samples in triplicate to evaluate structural information needed to support a business decision and accomplish this within a two week window. Brian led this effort, completing the campaign in 10 days. Brian coordinated all aspects of the campaign. He arranged for time on three instruments (two of which Brian negotiated to procure), installed the instruments and validated the method on each for quality purposes. He arranged training meetings that included associates from the MMC lab as well as Principal Investigators and associates from the participating business who would support the runs. He worked with facilities to assure that no scheduled interruption to any services would occur during the two week 24/7 campaign. He set up all run sequence templates and automated data processing and system suitability checks. Using his method, his team successfully screened over 28,000 complex polymer products to evaluate and fine-tune the routes by which they were made. Brian's successful development of this analysis method made vital polymer characterization information easily attainable—completed within 10 days, using only $3,000 in consumables and solvent. Obtaining this same information using a conventional SEC method would be highly impractical, requiring more than a year to complete, costing over $100,000 solvent and consumables.

Based on his technical skills and strong communication abilities, he is recognized among peers as a leader and routinely helps others with method development, instrument trouble-shooting, and helps with overall chromatographic theory questions and runs training sessions as needed. He is frequently asked to help other DuPont labs with SEC issues. He was the primary trainer and supervisor for a lab contractor, guiding his work and invests time in training new lab associates. He works to train and transfer new methods to other labs. He recently provided training on 5-minute SEC method to an external pilot facility.

Finally, he is the primary point of contact within the lab for any instrument or application issues. He conducts laboratory tours, detailing the many characterization capabilities. He serves as lab point person to outside groups, represents lab's capabilities, and provides detailed information regarding analysis technique, theory, and data interpretation.

Number of communications/publications (5%) Please do not include titles.

Internal completed communications >40; (5 Quarterly Highlights; 10 Posters; 3 Technical Reports; 1 CCAS Technical Seminar; 2 Domain Science Group Presentations; numerous project method development updates, data analysis reviews, and group safety contacts)

External publications, presentations, patents

2012: Brian invited by Dr. Frank Svec, chairman of the International HPLC conference, to co-chair the Polymer Chromatography session. He was sought because of his work on novel nanoparticle separation techniques on which he presented a poster.

Brian was selected by the organizing committee to give an oral presentation on multi-detector SEC of carrageenan and the need for fundamental understanding of polysaccharides in solution, at the International GPC Symposium in October 2015.

Brian is a co-author on at least 3 papers drafted for publication in peer-reviewed journals for submission later this year. He gave a well received presentation on September 3, 2015, to the Marinalg Consortium. Brian will also present this work at the International GPC Symposium in October 2015.

Internal presentations, publications Include SOPs, presentation to teams, etc.
Over the course of the past 5+ years, Brian was a primary author of two and a co-author of five presentations selected for DuPont's internal global technical conference, TechCon. Modeled after ACS meetings, TechCon draws from all of DuPont's global Science and Technology and business communities. In addition, Brian made numerous internal presenations as a core team member on several business led projects. He gave an oral presentation at one of the regularly scheduled CCAS Technical Seminars and presented three posters in the poster sessions.

Because Brian's innovative approaches are sought out by Principal Investigators both within CCAS and more broadly across DuPont, he is both invited and in some cases expected to attend and present at project team meetings. As an example, he was invited as one of the speakers on Soft Material Characterization to visiting students from Columbia University in July 2015.

Brian has given numerous presentations to research groups regarding the MMC lab's chromatography capabilities to separate and characterize complex macromolecules and the lab's expansive analytical capabilities. As part of these presentations, he has provided highly technical details of characterization techniques and analysis theory to product development teams.

Additionally, Brian has transferred various chromatographic methods to outside labs, requiring substantial technology transfer requiring detailed standard operating procedure (SOP) documentation; most recently, to an external pilot facility. Finally, Brian authored five SOPs during his tenure at DuPont.

Contribution to quality, safety, and other initiatives (5%)
Brian operates at the highest level of safety. His lab uses multiple exotic and extreme solvents in their chromatographic systems including highly hazardous solvents such as strong acids, caustic, fluorinated solvents. Some of these solvents are used under extreme conditions, such as very high temperatures. Brian participates in periodic laboratory safety audits and has authored safety protocol documents for various HPLC instruments, detectors, sample preparation aparati and hazardous sample and solvent management procedures.

Brian participates in all initiatives to raise the quality of chromatographic data using Six Sigma and other statistical approaches. He earned his Six Sigma "GreenBelt" certification for using multi-detection SEC systems for a bio-based macromolecule in December 2012. To help ensure product quality, a significant portion of Brian's work focuses on identifying and quantifying low levels of impurities or oligomers for a wide array of complex polymer systems. Finally, Brian provides regulatory support to meet compliance for bio-accumulation/low MW content limits, manufacturing plant validations.

Awards (5%)
2010: Business Award for consultation on UPLC instrumentation and applications.
2011: High-level cash award for work to adapt instrument communications from HPLC instrumentation to be compatible with pre-existing data management software.
2012: Mid-level award in recognition for an urgent repair on an HPLC-NMR instrument setup, allowing for continued research use.
2013: Award for work to repair an instrument that malfunctioned during a time of critical need, (vendor was not readily available).
2014: Award for his help in restoring functionality to an HPLC instrument—eliminating need for capital purchase.

Professional and community activities (ACS, AIChE, outreach, etc.) (10%)
Co-chaired 2012 Polymer Chromatography session at Int'l HPLC conference. Actively volunteers as a NICU parent-to-parent counselor with March of Dimes at Al DuPont Hospital for Children.