

Celebrating Plamen Atanassov's 60th Birthday

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This Special Collection is dedicated to Plamen Atanassov to celebrate his 60th birthday. For all those of you that know Plamen, you are well aware of his passion and devotion to science, technology, and history. Plamen is an excellent example of a scientist who combines enthusiasm with the highest level of energy and contribution. During his scientific career, he has distinguished himself not only for his prolific publication record, but also for the most interdisciplinary and highly collaborative character of all his research related to electrochemistry. Plamen has proven to be a critical leader in electrocatalysis and bioelectrochemistry with many well-recognized breakthroughs that guide the research directions we travel today. All these accomplishments have been possible thanks to a most fortunate combination of diverse technical preparedness, analytical talent, technical inventiveness, and inter-person organizational skill. In this short celebration, we first briefly describe Plamen's scientific history, which starts in a beautiful, culturally rich and fascinating country in the East of Europe (Bulgaria) leading to his current employment at the University of California Irvine. Secondly, the four scientists leading this celebrating initiative will briefly describe personal experiences and anecdotes related to the impact that Plamen, as an "older brother", mentor, colleague, and friend has brought into our nowadays lives.

Plamen's scientific journey, up to the current days, is a quite unique and fascinating adventure. Plamen graduated at the University of Sofia in 1987 specializing in Chemical Physics & Theoretical Chemistry. In 1988, he obtained a specialization in Bioelectrochemistry at the Frumkin Institute of Physical Chemistry and Electrochemistry, Moscow. He then received his PhD in Physical Chemistry/Electrochemistry from the Bulgarian Academy of Sciences where he was a scientist at the Central Laboratory of Electrochemical Power Sources (now Budevski Institute of Electrochemistry & Power Systems). In 1992, Plamen

moved to the United States and joined the University of New Mexico (UNM) as Senior Research Associate (1992–1993), and later as Research Assistant Professor (1993–1999) with the Chemical & Nuclear Engineering department. He then left academia to join a startup company named Superior Micro-Powders LLC (acquired in 2004 by Cabot Corp.) as Research Scientist. In 2000, he was hired as Assistant Professor with the Chemical & Nuclear Engineering department where in 2006 he became Associate Professor and Full Professor in 2009. He founded the UNM Center for Emerging Energy Technologies (CEET) in 2007, serving as the founding director till 2011. In the period 2012–2013 he was Associate Dean for Research of UNM School of Engineering. In 2014, he became Distinguished Professor of Chemical & Biological Engineering (new department name) at UNM. In 2015, he was appointed Director of the UNM Center for Micro-Engineered Materials (CMEM), a joint laboratory between UNM and Sandia National Laboratories. Plamen spent two sabbatical years, the first one in 2007 as a Visiting Researcher at the Hawaii Natural Energy Institute, University of Hawaii, Manoa, Honolulu, and the second one in 2014 as Visiting Professor at the University of Padua (Padua, Italy); University of Sofia, (Sofia, Bulgaria); University of Grenoble-Alps (Grenoble), and as Total Chair with the University of Montpellier (Montpellier, France). Starting in October 2018, Plamen joined the University of California Irvine (UCI) where he is a Chancellor's Professor with the Department of Chemical & Biomolecular Engineering, holding secondary appointments with Materials Science & Engineering and Chemistry. His educational efforts are directed toward creating a PhD program in Electrochemistry & Electrochemical Engineering. Currently, Plamen is engaged in several major initiatives of the United States Department of Energy, participating in the team to build the California Clean Hydrogen Hub – Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) and interfacing with hydro-


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gen technology demonstration and research efforts in the Pacific/Mountain/Southwest regions and Nation-wide.

Plamen is a bioelectrochemist “by training”, but he has been able to successfully translate this knowledge into other fields such as electrocatalysis for electrochemical devices, focusing mainly on metal air batteries and fuel cells. His bioelectrochemistry achievements span from enzymatic bioelectrochemistry to sensing and glucose biosensing, including long-term implantable glucose monitoring and intravenous monitoring of glucose and lactate, electrochemical immunosensors for viral and bacterial detection and DNA-based sensors. Important breakthroughs are reported for enzymatic oxygen reduction and glucose oxidation, as well as lowest level of bacterial cell detection by hand-held and portable devices. Integration of these reactions into electrodes through proper immobilization has led to paper-based enzymatic fuel cells. Design of efficient gas diffusion electrodes has led to a significant boost in the power output. Similarly, an innovative silica immobilization technique led to bacteria-based cells with well-defined biofilms.

He has been one of the pioneers in the recent development and advancement of platinum group metal-free (PGM-free) electrocatalysts. Silica templated synthesis of such transition metal-nitrogen-carbon (M–N–C) materials gave rise to the first commercially available PGM-free catalysts, used currently as a benchmark by many. Plamen pioneered the use of M–N–C catalysts for circum-neutral pH in biological/microbial electrochemical systems. These catalysts have revolutionized the cathode performance in microbial electrochemical technologies and systems for biological and bio-inspired energy harvesting and water treatment. Plamen’s materials for energy programs has been focused on development of novel electrocatalysts for which he is one of the main worldwide recognized contributors, with particular attention to non-platinum electrocatalyst for fuel cells, nano-structured platinum catalysts, and advanced supports. Novel materials synthesis and development, along with integration into electrodes, has redrawn the roadmap for future advances, and led to significant technological transfer. Most recently, Plamen’s research direction has expanded towards catalysts for CO₂ electroreduction and product valorization, electrosynthesis of ammonia and new materials, and enabling technologies for energy conversion and storage. He holds 56 issued US patents, a substantial number of which have been licensed and form the core of commercial catalyst products.

He has published more than 450 peer-reviewed papers (bringing 34 K+ citations and forming an h-index of 94). Importantly, he supervised 40 completed PhD dissertations at UNM and UCI and had advised more than 25 postdoctoral fellows. For each PhD graduated, he collects a bottle of different sparkling wine or juice, each with the defense date and signature of the student. His PhD students and post-doctoral associates work around the USA and entire world, and each has a story to tell of growth and achievement. Countless students have benefited from personal and scientific interactions with Plamen, learning from his deep knowledge.

These critical scientific achievements have led to national and international recognition. In 2007, he received the ACS Division of Fuel Chemistry Outstanding Service Award. In 2012, he became Honorary Professor of the Budevski Institute of Electrochemistry & Power Systems, Bulgarian Academy of Science. In 2014, he received the STC.UNM Innovation Fellow Award, UNM’s highest award for intellectual property and technology transfer. In 2019, he received the Energy Technology Division Research Award from the Electrochemical Society. In 2018 he was inducted in the National Academy of Inventors, and he is now a Fellow of both The Electrochemical Society (2018) and the International Society of Electrochemistry (2020). Plamen served as a Vice-President of the International Society of Electrochemistry (2015–17) and in 2022, he was elected President of the International Society of Electrochemistry (for the 2023–28 term). As an outstanding teacher who regularly receives high praise from students, Plamen is very proud of the “Top Gobbler” ChNE Student Appreciation Award, received from UNM students in 2000 and 2005.

We thank all the authors that have submitted and published a contribution to this Special Collection to celebrate the 60th birthday of one of the main contributors of electrocatalysis and bioelectrocatalysis of our time. Happy 60th birthday, Plamen!

Carlo Santoro



“My first interaction with Plamen did not happen in the best way anyone can imagine, but it is a story of opportunities and fortunate combinations that gives hope to many, highlighting the possibility of fixing things when they are broken. I was a third year PhD student at UConn and during my talk at the 2012 Spring ACS meeting in San Diego, in the audience, a professor severely criticized the conclusion of my findings, and this situation both terrified me and at the same time gave me an opportunity. I could have hidden or I could set aside my ego, and meet the challenge to learn; I am happy to report that I selected the second option. After the talk, I approached that professor and asked him to have a drink together to understand my potential mistakes. “I want to buy you a drink and learn from you”. That gentleman was Plamen and he discussed with me my conclusions, clarifying many concepts about the reduction of oxygen over carbonaceous materials and suggesting that I read a couple of books.

Our second interaction was at the ECS in Honolulu in 2012 (12/2012) where he organized a Symposium on bioelectrochemistry. Obviously, I avoided presenting my work at this Symposium, organized by Plamen, just to avoid a second “grilling”. However, I had the chance to meet him and propose a possible way of collaborating. He then invited me to spend 10 days at the University of New Mexico (UNM) where I learned how to integrate enzymes at the cathode of a microbial fuel cell. This interaction allowed me to learn many concepts and expand my knowledge, and led to a Becket ECS Summer Fellowship that I spent in his lab. I remember that day in July 2013, waiting outside his office door, and Plamen popping up from behind the corner, dressed in Hawaiian clothes telling me: “Hi Carlo! Welcome home!” Later, I was hired as a Post Doc in his lab and then promoted to Research Professor. I spent four fantastic years with Plamen at UNM, enjoying life and growing very much as person and scientist. Leaving him and the group in 2017 has been a quite challenging and difficult adjustment. Plamen has been very inspiring as person and scientist, and I have noticed that this feeling is shared with many people and not just in the academic context. I remember many group meetings talking about science where I have felt embarrassingly ignorant, but this has given me the possibility to spend night in the library, learn and in turn, grow. I feel that scientifically speaking (and not only), he has been a pillar, and as I have arrived where I am right now and am able to do work I actually love, I need to thank Plamen. He gave me a tremendous opportunity, for which I feel very privileged. I always like to tell my personal story with Plamen as I consider it a story of my personal growth, success, and inspiration. To me, Plamen has been an older brother, a friend, a colleague and a scientific father. I wish him a happy 60th birthday!”

Matteo Grattieri



“I first met Plamen in 2013 when I joined his group at the University of New Mexico for a Visiting Research Period within my PhD studies. I was a young PhD student working on enzyme electrodes for application in microbial fuel cells and I read all Plamen’s papers on electrochemical biosensors but I have never met him before that day. At that time, Plamen was the Associate Dean for Research of the School of Engineering at UNM. I was quite afraid to step into the “Office of the Associate Dean”, but once I knocked on the door and got in, I still

remember how kindly he welcomed me and spent time to get to know me, give me research tips and discuss the goals of my visiting period. He immediately gave me his full support to ensure that my period in his group could be as beneficial as possible. After that day, not only did I start regularly meeting him to discuss the results of my research, but we spent time enjoying delicious meals and discussing about history, travels, and life experiences. You can rest assured that sitting at a table with Plamen you will learn something new. The time I spent with Plamen made me love science even more, and strongly impacted my scientific career. After I returned to Italy to conclude my PhD studies, Plamen continued to provide me all his support and mentoring. Particularly, he supported me when I was about to decide the next step of my journey at the end of the PhD. It was while having lunch (of course!) with Plamen at a conference in Malmo that he suggested me to get in touch with Prof. Shelley D. Minter for a possible postdoc position at the University of Utah. That chat over a nice meal led to almost five successful years in Shelley’s group as a Postdoctoral Researcher and later joining the University of Bari as an Assistant Professor. Since then, Plamen and I met several times and always had stimulating and fruitful scientific discussions. I will always be grateful to Plamen for having accepted me in his group and helped me to find my scientific pathway. I think that this is one of his great capabilities: to help people choose the road that is best for them. Happy Birthday Plamen!”

Sofia Babanova



“I first heard about Plamen from his ex-coworker at the Bulgarian Academy of Science. We were chatting about Christmas plans and my next steps after I complete my PhD, which was due in two months. I shared my hopes to find a post-doc position when she mentioned that Plamen visited them that same month and mentioned that he is looking to hire a post-doc in his group exactly in my area of interest. I think this was faith. It was meant to meet Plamen.

I first talked to Plamen on Skype soon after and this conversation changed my life forever. It brought me to United States and opened a completely new career path for me. I started as a post-doc in Plamen’s group at University of New Mexico, very different scenery from what my whole life had been to this point. Plamen became my mentor and my friend.

He supported me and guided me from the start and continues to do it till this day. I remember a conversation we had right after I became a Research Assistant Professor. He was excited to share with me the good news that I have been promoted and a second later he asked me what I am planning to do next, what is my next career goal. That is Plamen, always thinking ahead, always pushing you to move forward, think big. He convinced me to take on my next adventure and join the team of Orianna Bretschger, which turned to be another big decision in my life. I am where I am and who I am professionally because of Plamen.

He gave me the opportunity to touch on so many different scientific topics, learn a lot, grow a lot. Working with him gave me the knowledge and confidence I needed to continue in my career path. I don't know a single topic he is not knowledgeable about, and he is always open and eager to share this knowledge and help. He is always baking new ideas in his head. He is very creative and open minded in both, his professional and personal life. His students love him. At UNM, the students created a board in the lab with our pictures under a sign saying "Plamen slaves" and all of us were so proud and happy to be part of this special group. Plamen, thank you for believing in me and being my professional and personal mentor and a friend. I'm looking forward to many more years of collaboration and friendship. Happy Birthday!"

Scott Calabrese Barton



"I first met Plamen almost exactly 20 years ago, in 2002, when

we were both newish assistant professors. Plamen organized and ran a DoD workshop on biological fuel cells with around 100 attendees, which kind of blew my young-researcher mind. He was a whirlwind of energy at that workshop, and I didn't quite recognize it then, but this was the first example, for me, of Plamen's ability to bring groups of scientists together around key scientific questions. His deep scientific understanding combined with his gregarious nature make him a person around whom scientists congregate, and he uses those abilities to enact a unique kind of scientific leadership. I could list the many ways I have seen this manifested, starting with that workshop, continuing through several multi-PI research projects, and workshops in Santa Fe and Telluride on myriad electrocatalysis topics ranging from bioelectrocatalysts to alkaline fuel cells to carbon dioxide electroreduction. And in interacting with him in these contexts, one could feel the joy he himself experiences in pulling off these capers.

Plamen and I have many research interests in common, spanning bioelectrocatalysis, fuel cells, and electrochemical kinetics. I lean more toward modeling, and Plamen's research has been more rich in physical characterization, and so we have frequently found ways to collaborate, spiced with some healthy competition. All of these interactions have been treasured opportunities to grow our friendship, and get to know Plamen beyond science, as an artist, a storyteller, a teacher, and a father.

There are too many fond memories to count, but I'll bring up this one: I've only been to the Great Wall of China once, and it was with Plamen in 2014. I'm a runner and perhaps an athlete, and for the life of me I could not keep up with Plamen as he climbed and descended the staircases of the Great Wall with abandon. To me, that exemplifies the way Plamen approaches life, with an energy and joy that is invigorating and contagious to the rest of us."

EDITORIAL

Dedicated to Plamen: In this Guest Editorial, we intend to celebrate the 60th birthday of Prof. Plamen Atanassov. We have here described his personal and scientific journey highlighting the contributions to the field of electrochemistry and in particular to electrocatalysis and bioelectrochemistry. Personal stories of four colleagues or former students/Post Docs of him are reported highlighting the impact of Plamen not just in science but also in the personal life of people.



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