



*Editorial*

## The 2022 Young Innovators of Cellular and Molecular Bioengineering

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We are pleased to present to you this year's twelve Young Innovators of Cellular and Molecular Bioengineering, whose original research is featured in this October issue. It is now the ninth year of the Young Innovators competition, and we continue to receive a large number of compelling nominations. All potential authors who hold the rank of Assistant Professor (or equivalent) at the time of nomination are eligible for selection, and while many of the authors are active members of the Biomedical Engineering Society (BMES), membership in BMES is not a requirement for inclusion. As in previous years, awardees presented the papers in this issue in a pair of invited plenary sessions at the 2022 Annual Meeting of BMES, recently completed on Friday, October 14, 2022. The articles in this issue represent some of the most innovative and impactful bioengineering studies carried out by junior faculty in our field. This year's Young Innovators are all clearly recognized as rising stars in their field, and significantly, have completed their research studies under the challenge of a global pandemic which has waned in its severity but is not yet over.

Six of this year's Young Innovator papers focus on studies related to nanoparticle/microparticle-enabled drug delivery or in biomaterials technologies intended for eventual in vivo deployment. Gregg Duncan and colleagues tested the transport properties of nanoparticles conjugated with either linear polyethylene glycol (PEG) vs. star-shaped, branched PEG, and compared their diffusion through mucus collected from patients with cystic fibrosis. Devika Manickam and coworkers developed extracellular vesicles enriched with mitochondria, and showed that this can increase ATP levels in recipient brain endothelial cells. Rebecca Wachs et al. encapsulated manganese porphyrin into chondroitin sulfate-A microparticles for long term scavenging of reactive oxygen species, testing their particles for up to 84 days. Adam Gormley and colleagues showed that polymer texture affects cellular responses to osteogenic microparticles, utilizing an impressive automated robotic sample handler in their process. The article of Omid Veisheh and coworkers describes the development of serum-free media to cryopreserve

hydrogel-encapsulated cellular therapeutics, supporting a technology which has progressed to human testing. Sebastián Vega et al. showed how decellularized celery and other plant tissues can serve as an effective (and anisotropic) substrate for mesenchymal stem cell culture, representing an exciting new biomaterial for tissue engineering applications.

Six other papers in this special issue involve applying the tools and concepts of engineering to reveal fundamental new biology, or the development of in vitro biomedical systems. Nikki Reinemann and colleagues carried out careful subcellular measurements of myosin II dynamics using optical trapping, which reveals three qualitatively different types of force profiles depending on the local myosin concentration. Donny Hanjaya-Putra and coworkers used a microfluidic assay and RNAi transfection to identify podoplanin as a key driver controlling the differential development of blood vs. lymphatic capillaries. Katharina Maisel et al. created a sophisticated in vitro coculture model of the gut, showing that the ratio of epithelial and goblet cells controls the height of the mucus layer. Abhinav Bhushan and colleagues developed a microfluidic device to study the coculture of intestinal cells and gut bacteria, with integrated localized oxygen sensors to monitor oxygen transport in this milieu. Chelsea Magin and coworkers worked with both healthy and fibrotic decellularized extracellular matrix, to model the inhibition of gas exchange in pulmonary fibrosis. Justin Pritchard et al. developed an agent-based model of cancer-associated fibroblast interactions with tumor cells and genetic mutations that lead to drug resistance.

At the 2022 BMES Annual Meeting in San Antonio, we held our usual Editors' business meeting. Joining us at this lunch meeting were over thirty current and previous CMBE Young Innovator authors, to our knowledge the largest group of Young Innovators (past and present) to ever be assembled in one place (Fig. 1). This group had much to celebrate, including the 15th year (and volume) of publication of the journal, which has been further highlighted by Springer Nature with a "CMBE Most Cited Articles: The First Fifteen Years" collection, available to



**FIGURE 1.** CMBE Young Innovators past and present joined our Board of Associate Editors at the 2022 BMES Annual Meeting.

readers without a subscription (<https://link.springer.com/collections/efdbddeciai>).

We hope that you will enjoy reading this impressive collection of research articles as much as our reviewers and editors and that you will encourage your eligible colleagues to nominate themselves for next year's CMBE Young Innovator competition. Self-nominations are due by November 11, 2022, with selected authors notified by December 16, 2022, and full manuscripts due by February 17, 2023. Interested researchers who hold a position at the rank of Assistant Professor (or equivalent) are invited to submit a 250-word structured abstract and an NIH-style biosketch to Editor-in-Chief Michael King at [mike.king@vanderbilt.edu](mailto:mike.king@vanderbilt.edu). You are invited to engage with us via social media on Twitter ([www.twitter.com/CMBEjournal](https://www.twitter.com/CMBEjournal)) and Facebook ([www.facebook.com/CMBEjournal](https://www.facebook.com/CMBEjournal)). We hope to see you at the 2023 BMES Annual Meeting in Seattle, WA, at the 2023 CMBE Conference in Indian Wells, California, and online!

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