Cell Biomaterials

Voices

Voices across time and around the world: Honoring Dr. Kam Leong's legacy

Hai-Quan Mao
Johns Hopkins University and Medicine

A mentor who taught us the meaning of scholarship

When I joined Kam's laboratory as a postdoctoral fellow in 1995, I was not entirely sure what I could achieve in science beyond knowing that I loved doing research. At the time, I believed, somewhat naively, that raw talent, hard work, and a few good ideas were sufficient for success. Training with Kam fundamentally changed that perspective. Under his mentorship, I learned the deeper foundations of scientific scholarship: how to think critically, how to frame meaningful questions, and how to approach problems with both creativity and rigor. Most importantly, I came to appreciate the intellectual joy of the research process itself.

Kam's mentorship is remarkable not only for its rigor but also for its humanity. He has an extraordinary ability to connect with younger scientists and nurture their growth without imposing rules or heavy-handed guidance. I was fortunate to work alongside him early in his career, observing firsthand how he thinks through scientific problems and decisions. Through this quiet example, he shaped my approach to research in ways that continue to influence me today.

Over the years, Kam has built something far larger than a laboratory. He has created a global family of scholars whose work and mentorship carry forward the values he embodies.

Chai-Hoon Quek
Columbia University

A legacy through unwavering passion, perseverance, and a commitment to supporting young scientists

Professor Kam Leong has devoted over 30 years to advancing biomaterials for gene delivery. His laboratory focuses on the development of cationic polymers with versatile applications, ranging from the scavenging of extracellular nucleic acids released during chronic activation of inflammatory cells to nonviral carriers for oral delivery of biologics to target gut-associated lymphoid tissues.

Conventional treatments for chronic diseases, such as rheumatoid arthritis or systemic lupus erythematosus, often involve medications that suppress the immune system. By contrast, his laboratory has developed cationic polymers that can selectively bind extracellular nucleic acids (DAMPs) released by dead or dying cells, thereby preventing their interaction with pattern recognition receptors that trigger inflammation.

In addition, his laboratory has developed a range of cationic polymeric carriers for oral delivery of therapeutic biologics, including proteins, transgene DNA/RNA, and CRISPR-Cas9. This nonviral oral delivery system has been applied to the treatment of chronic conditions that require repeated dosing, such as irradiation-induced injuries. Furthermore, these systems enable localized mucosal immunoengineering, facilitating immune activation within the tumor microenvironment (e.g., colorectal cancer) and supporting the delivery of anti-inflammatory biologics for disorders such as inflammatory bowel disease.

Collectively, his research on cationic polymers is anticipated to have a significant impact on the future of biomaterials and bioengineering.

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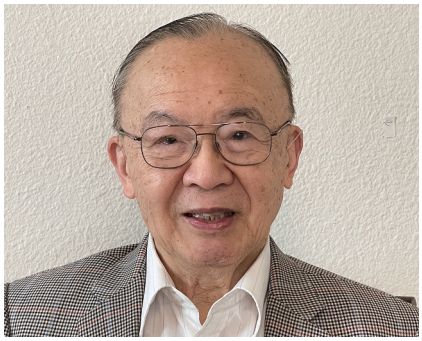
Yeh-Hsing Lao
University at Buffalo, The State University of New York

Kam's innovations, visionary leadership, and mentorship have advanced the biomaterials field for 40 years

Kam has dedicated 40 years to advancing the biomaterials field, where he has pioneered many areas of drug delivery, regenerative medicine, and bioengineering. Kam always approaches research questions via a unique, outside-the-box angle, which has led to significant advances in drug delivery for glioblastoma, oral gene delivery, cell reprogramming for tissue engineering, inflammatory control, genome editing, and disease modeling. Discussing science or brainstorming ideas with Kam has been always exciting to me since my time in the lab with him. Kam is the most approachable and energetic mentor. He treats everyone like his family and puts his mentees as his priority. There have been so many occasions when we chatted at midnight or while he was waiting for his flight at JFK simply because I had a small question about science or just my life. Kam always helps and does it with a smile. He is wise, and I have always benefited from his advice and experience. Kam is also the most humble scientist I have seen and always gives credit to his mentees, colleagues, and collaborators. It is truly my biggest fortune to be part of the Leong Lab family.



Shu Chien
University of California, San Diego

Developer of innovative approaches for disease modeling, drug screening, and treatments of brain cancer, neurodegeneration, and genetic disorders

Dr. Kam Leong has made important contributions to nanomedicine, drug therapy, gene therapy, immunotherapy, and cell therapy. He has developed innovative biomaterials for applications in regenerative medicine. He has applied polymeric biomaterials for chemotherapeutics and DNA-based therapeutics. He has also applied tissue engineering principles and stem cell engineering to construct human tissue-on-a-chip and organ-on-a-chip for disease modeling and high-throughput drug screening.

Dr. Leong has developed a tumor vaccine composed of cytokines and tumor tissue fragments from patients to treat brain cancer. He has used DNA nanoparticles to deliver FVIII and FIX genes orally to treat hemophilia in animal models. He has also developed nanomanufacturing techniques to produce DNA nanoparticles for clinical application. He pioneers the application of DNA nanoparticles to convert adult cells from one cell type to another, raising the possibility of treating intractable neurodegenerative disorders via nonviral cell reprogramming. He has also developed nanoparticle-mediated genome editing technologies to correct genetic disorders.

Dr. Leong is a member of the National Academy of Medicine, National Academy of Engineering, and National Academy of Inventors. He is an honorary professor of five universities. He has received many important awards and honors from the USA and around the world.

Guangjun Nie
National Center for Nanoscience and Technology

Pioneering biomedical scientist-engineer and mentor of the young generations

Kam is a world-renowned, pioneering biomedical scientist. Communicating with him always brings warmth and great gains—he is not only a respected mentor but also a sincere friend. He is like an encyclopedia of biomaterials and biomedical engineering, and every interaction with him brings unexpected discoveries and insights.

Recently, we have been particularly interested in personalized cancer vaccines. When we presented our latest progress and clinical trials in this field to him, Kam showed great interest and offered us strong encouragement, which greatly boosted our confidence in advancing this research.

Notably, his early work laid a solid foundation for our research: he codeveloped a patient-specific brain cancer vaccine that combines cytokines with autologous tumor fragments and has been used to treat several hundred patients in Japan.

Such valuable academic and personal interactions with him brought me his deep insights and continuous support and filled me with pleasant surprises and genuine admiration.

Song Li
University of California, Los Angeles

A leader in science, a builder of community

For many of us in the biomaterials community, Dr. Kam W. Leong is not only a leader but also a mentor. On the occasion of his 70th birthday, we celebrate his career that has shaped both the field of biomaterials and many of the people within it.

Dr. Leong's work has bridged biomaterials, drug and gene delivery, and medicine. From early contributions to gene delivery and polymeric biomaterials to more recent advances in regenerative medicine and disease therapy, his research has influenced how we think about designing materials for therapeutic use. Beyond his research, Dr. Leong has played a central role in the biomaterials community. He has led the journal *Biomaterials* for decades and has trained generations of researchers who are now leaders in bioengineering and related fields. Through his broad engagement with scientists worldwide, he has helped foster a culture of openness, creativity, and collaboration.

This special issue of *Cell Biomaterials* reflects the scope of his impact. As we mark this milestone, we recognize that Dr. Leong's legacy lies not only in his scientific contributions but also in his commitment to mentorship and to the scientific community.

Savio L-Y. Woo
University of Pittsburgh

A few words to a remarkable scientist, teacher, and friend

Happy 70th birthday, Kam!

It was a special day for us to meet about 30 years ago and my good fortune to have worked closely with you for the National Health Research Institutes (NHRI) for over 20 years, at Beihang University and Taiwan Medical University plus the World Association for Chinese Biomedical Engineers (WACBE) for over 10 years. In time, I learned how impactful your research on drug and gene therapy and regenerative medicine was. Specifically, your novel works on transdifferentiation of adult cells directly into different types of cells and using nanoparticles to achieve direct cellular reprogramming: all are for the 21st century.

Thus, you earned the accolade "Engineering Better Medicines"!

Through the years, I have watched and admired your caring mentorship for younger investigators—to ask the right research questions (*why*), to determine the right objectives (*what*) and to employ the most appropriate technology for their tasks (*how*)! You used an enormous amount of time and energy to share new knowledge everywhere—including giving back to your roots in Asia (hometown Macao). Your dedication to teaching is indeed unparalleled.

On this special day, I wish for *you*, a caring person with character and charisma, great health and strength to carry on your seminal contributions to our field for many more years!

Yizhou Dong
Icahn School of Medicine at Mount Sinai

Dr. Kam Leong is a visionary leader who transformed nanomedicine and regenerative medicine

Dr. Leong has profoundly influenced the field by pioneering biomaterials and nonviral gene delivery strategies that helped lay the scientific foundation for modern nanomedicine and regenerative medicine. His work bridged engineering, biology, and medicine, demonstrating how rational material design can control cell behavior, enhance nucleic acid delivery, and enable translational therapeutic platforms. Many concepts now central to drug delivery and tissue engineering trace back to his innovative contributions. He is widely known as a deeply supportive and collaborative mentor who fosters interdisciplinary partnerships and empowers young investigators to pursue bold ideas. Throughout his career, he has devoted extensive effort to training the next generation of researchers, creating an environment that values rigor, creativity, and integrity. His commitment to mentorship and collaboration has amplified his scientific impact through the success of his trainees worldwide.

Ke Cheng
Columbia University

A molecular and material architect who reimagined how we deliver, edit, and harness biology

Kam's influence is both broad and foundational. He is a pioneer in developing multifunctional nanoscale technologies for delivering drugs, antigens, proteins, small interfering RNA (siRNA), and DNA to cells. The translational reach of Kam's work is remarkable. In cancer therapy, Kam collaborated with Dr. Tadao Ohno to develop a tumor vaccine comprising cytokines and tumor tissue fragments from patients—a treatment used on over 350 brain cancer patients in Japan. He is also a key member of the team that invented Gliadel, a biodegradable polymeric wafer that delivers the drug carmustine directly into the brain tumor site after its surgical removal, to improve the efficacy of the drug and prolong the survival of the patients.

At Columbia, the Leong Lab and Cheng Lab are next to each other. I view Kam as my great colleague, mentor, and friend. He was critical in recruiting me to Columbia. He was the first one to knock on my office door after my joining and said, "I want to collaborate with you!" Kam is a pure scientist. We both work late into the night. It was not uncommon that Kam would sometimes knock on my door at 11 p.m. and say "I have an idea . . ." Kam is super generous and kind. When my lab needed to undergo some remodeling and the entire lab became inaccessible, Kam offered his lab space to my group during that interval.

Dan Shao
West China Hospital of Stomatology, Sichuan University

Redefining cationic biomaterial: From gene carrier to intrinsic immunomodulator

As a postdoctoral fellow in Prof. Kam W. Leong's Nanotherapeutics and Stem Cell Engineering Laboratory at Columbia (2016–2019), I went through one of the most demanding and challenging yet transformative periods of my career. For a junior researcher arriving from China, the greatest difficulty was to find the right directions. It was Kam who earnestly steered my perspective, reminding me that for a scientist in biomedical engineering, nothing matters more than the impact of translation.

This principle is vividly reflected in his own work. Kam has made outstanding contributions to designing sophisticated materials for drug delivery, particularly in oral gene editing. Notably, he played a pivotal role in the development of the FDA-approved Gliadel that delivered carmustine to the brain for postsurgical treatment of glioblastoma. Importantly, the deep understanding of macromolecule-material interactions naturally led him to explore how cationic biomaterial could be harnessed to sequester negatively charged nucleic acids for anti-inflammation.

Collectively, Kam is widely recognized as a pioneer who reshaped the role of cationic biomaterial, from gene carrier to intrinsic immunomodulator. Inspired by his vision, my current research focuses on leveraging therapeutic biomaterials to control intractable inflammations, including severe sepsis, trauma, and multiple organ failure.

Ying Zhang
Regulatory Scientist for Cell and Gene Therapies

Beyond publications: Dr. Leong's legacy of scientific perseverance and personal growth

Dr. Kam Leong's legacy reflects a rare combination of scientific rigor and compassionate mentorship. His deep dedication to science, together with his enthusiasm for discovery, helped build a global community of students and collaborators who continue to contribute to the fields of biomaterials and biomedical engineering.

Dr. Leong approached mentorship with sincerity and care. He believed that the true measure of a scientist went beyond publications or citations, placing greater importance on intellectual honesty, creativity, and personal growth. As he often reminded his students, "I don't judge my students on whether they publish but on whether they truly grow into creative scientists and scholars while remaining honest."

One lesson he often shared continues to resonate: "Be humble and be aggressive." Although the phrase may seem paradoxical at first, its meaning becomes clearer with

time—encouraging young scientists to pursue bold ideas with determination while remaining grounded, open-minded, and respectful of others.

Today, Dr. Leong's influence continues through the many scientists he mentored. Across academia, industry, and medicine, his trainees carry forward not only his scientific vision but also the values he embodied—perseverance, humility, and integrity.

Jennifer Elisseeff
Johns Hopkins University

Combination of scientific rigor, humility, and mentorship that shaped both the field of biomaterials and the people within it

I first met Kam when I was a graduate student. Even then, he took the time at scientific meetings to speak with me and offer thoughtful career advice. His influence on my life became even more significant when I joined Johns Hopkins as a junior faculty member. At the time, Kam was the senior faculty member in the department working in biomaterials and tissue engineering, and his mentorship was invaluable during those early years.

What I learned most from Kam was the rare combination of scientific rigor and genuine humility. He approaches science with depth and precision, yet always with kindness and generosity toward others. I always trusted his advice because it was balanced, thoughtful, and grounded in care for people. Just watching how he interacted with colleagues and trainees taught me as much as any formal guidance.

Kam's influence on the field is evident through his pioneering research, his extensive body of work, and the many students and trainees who now lead their own efforts in biomaterials and bioengineering. Equally important is the set of values he instilled in those he mentored. His quiet strength, intellectual curiosity, and humility continue to shape the next generation of scientists.

Ali Khademhosseini
MatterX Inc.

Transformed biomaterials into dynamic, intelligent systems to improve human health

Kam's impact on biomaterials and bioengineering is difficult to overstate. His pioneering work on multifunctional nanoparticles for drug and gene delivery fundamentally expanded what the field considered possible, and his innovations in nonviral gene editing opened therapeutic avenues that continue to grow. What has been particularly inspiring to me is his work on organs-on-chips—especially tissue-engineered blood vessels and patient-specific brain organoids for disease modeling. These platforms have been truly pioneering and have directly influenced my own research in organ-on-chip technologies and tissue engineering. Kam showed us that biomaterials could be more than structural—they could serve as the foundation for recreating human physiology in ways that accelerate drug discovery and reduce our reliance on animal models.

Beyond the lab, Kam's leadership as editor-in-chief of *Biomaterials* for the past decade has shaped the standards and direction of our entire community. He has been a thoughtful and supportive mentor and a role model to a generation of biomaterials scientists, including myself. Looking ahead, I believe Kam's integrative vision—combining materials science, stem cell engineering, and microphysiological systems—will define the next generation of precision medicine and personalized therapeutics. His legacy is not just in the discoveries themselves but in the way he has inspired so many of us to think bigger.

Evelyn Yim
University of Waterloo

Pioneer of nonviral gene delivery and supporter of generations of trainees

Working with Professor Kam Leong has been one of the most important experiences in my research and career development. I remain deeply grateful not only for the opportunity to be trained as his PhD student but also for his constant encouragement and support throughout my research journey. I am especially thankful to be part of the "Leong Lab family," a community of trainees who continue to stay connected as lifelong colleagues and friends.

Dr. Leong's legacy in bioengineering is difficult to capture in a single sentence. His pioneering work in nonviral gene delivery has significantly shaped the field, demonstrating how biomaterials can be engineered to enable safe and effective gene transfer with translational potential. These innovations have inspired scaffold-mediated delivery strategies for tissue engineering, while many of his trainees continue extending these ideas into new areas of biomaterials and regenerative medicine.

As a mentor, Dr. Leong is supportive, open-minded, and deeply enthusiastic about science. He encouraged us to pursue bold and creative ideas while offering thoughtful advice and unwavering support. His most lasting lesson is his forward-looking mindset—always asking what the field truly needs next.

Andrés J. García
Georgia Institute of Technology

Transformative contributor to nanotechnology—In drug/gene delivery, nonviral gene editing, and anti-inflammation nanomaterials

Prof. Leong has made seminal and transformative contributions to nanotechnology-enabled drug delivery, gene delivery, nonviral gene editing, and anti-inflammation nanomaterials. His impact spans diverse areas from biomaterials design principles, cancer nanotheranostics and immune engineering, and foundational advances in gene delivery and nonviral gene editing. His technologies have been translated to life-saving therapies. Beyond these impactful scientific contributions, Prof. Leong is a dedicated mentor to younger generations of biomaterials researchers and a great colleague. He has provided tremendous leadership to the field, including as editor-in-chief of *Biomaterials*.

Andrew Adler
Novo Nordisk

Humble mentor who drastically amplified his positive scientific and humanistic reach

Kam's "mentorship style" (who he is) has defined the course of both my scientific and personal lives.

As an undergraduate student, I began in polymer chemistry sniffing chloroform in Iowa and mouth pipetting gene therapies in Chicago—both fields that Kam is comfortable with, to say the least. For the first half of my PhD, we worked on a combination thereof. Kam quietly built me up, acting as a scientific father far beyond what I deserved, I now realize.

Then, the reality-shaking premise of iPSCs and iNs arrived, and we as a lab collectively wondered if it was real. Kam encouraged us to try, even though this was very weird and surely beyond a less-empathetic PI's comfort zone and ego. So, I spent a couple months cloning nonviral versions of the neuronal reprogramming factors with the help of the real molecular biologists in the lab. Then there came one shot to see whether neurons could be made from fibroblasts, with a single peek into the microscope.

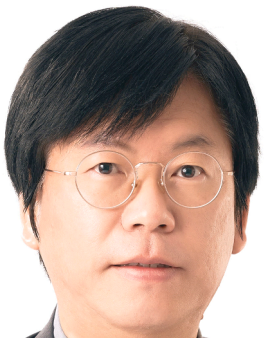
There were neurons.

I now have a passion, a wife equally passionate about cell therapy, a contribution to a handful of patients (so far), and a daughter, thanks to Kam (and our colleagues).

Yuliang Zhao
Institute of Nanotechnology and Intelligence (inAI), Jinan University

Prof. Kam Leong pioneered the field of biomaterials from fundamental discoveries to translation in drug and gene delivery

Dr. Kam Leong is a leading scientist in the field of drug delivery and gene therapy, internationally recognized as a pioneer in oral gene therapy. He has made groundbreaking contributions to biomaterials in biomedical applications and achieved clinical translation. His significant advancements in polymer material design and the interaction mechanisms between polymers and drug molecules have greatly propelled the development of medical polymers and their applications in drug delivery. In the field of gene therapy, he was the first to achieve oral delivery of gene therapeutics, and he made major contributions to the design of cationic polymers and the elucidation of interaction patterns with biomacromolecules. He has also pioneered work in bioactive materials and inflammation regulation, serving as one of the founders in the direction of directly modulating inflammation using biomaterials. His research has provided essentially fundamental discoveries and innovative technologies for the advancement of the global biomaterials field. His leadership is defined by a combination of pioneering scientific vision, profound humility, and a deep commitment to mentorship of global students and service to the biomaterial community, empowering others and building bridges to tackle major medical challenges. As the long-time editor-in-chief of the journal *Biomaterials*, he also significantly shapes the direction of the entire field of biomaterials.



Sei Kwang Hahn
Pohang University of Science and Technology (POSTECH)

LEONG: Legendary engineer on nonviral gene-delivery

Recently, mRNA vaccines using lipid nanoparticles have had a significant impact in combating the worldwide COVID-19 pandemic. This great achievement has been made possible by extensive prior research on nonviral gene delivery systems. Needless to say, Kam Leong is one of the best gene delivery engineers. He has developed various nonviral gene delivery vehicles using natural and synthetic polymers, multifunctional nanorods, and hybrid materials. On top of that, he is creative and open-minded to convergence technologies, initiating the special issue "Biomaterials innovations and challenges for wearable bioelectronic devices" in the journal *Biomaterials*. With recent advances in bioelectronics, a variety of healthcare devices have been developed for diagnostic, therapeutic, and theranostic applications, greatly improving patient compliance. To take advantage of gene delivery and bioelectronic technologies, digital genetic precision nanomedicines are emerging for smart healthcare applications. The integration of bioelectronic platforms with gene drugs and advanced drug delivery systems using innovative biomaterials would offer a new paradigm for transforming healthcare and treating intractable diseases. These convergence systems, including optogenetic and sonogenetic systems, would create unique opportunities for real-time, high-throughput, and multiplexed analysis of physiological activities and on-demand genetic therapeutics for personalized precision nanomedicine.

Sing Yian Chew
Nanyang Technological University

World-class gene delivery, infinite patience for good science, and a surprisingly high tolerance for headstrong students

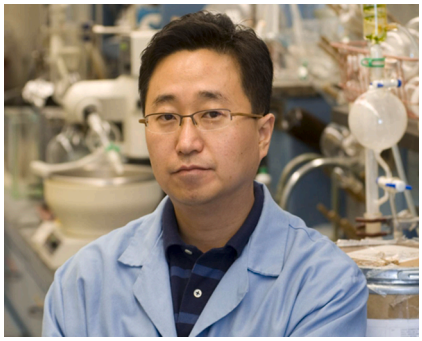
Among the many fortunate turns in my scientific career, none has shaped me more profoundly than having Dr. Leong as my mentor. His mentorship style is best described as the academic equivalent of a caring parent: he hands you the keys, trusts you to drive wherever curiosity leads, and spends the entire journey quietly worrying from the back seat without ever once telling you to turn around.

As a graduate student in his lab, I was, by any reasonable measure, a handful. I declared I would never work on controlled release—a field I have now spent over two decades in. I insisted that my graphs needed no improvement, since surely the world would be dazzled by the science alone. It would not.

As I later became a faculty member myself, I came to fully appreciate the scale of his patience. Had I been my own PI, I probably would have shown myself the door fairly early on. What has stayed with me most vividly is a moment from my early days as a junior faculty, when self-doubt had become my primary research focus. When I finally

brought him my comprehensive collection of anxieties, he peer-reviewed it in three words: "Just do it."

Three words. No footnotes, no caveats. To this day, whenever fear tries to anchor me in place, those three words push me forward.



KiBum Lee
Rutgers University

Dr. Kam Leong bridged the gap between materials innovation and clinical translation through thoughtfully engineered biomaterials

Regenerative medicine has held enormous promise since the discovery of the Yamanaka factors, offering the possibility of replacing damaged or diseased tissues with engineered cells. Yet the field soon encountered a major translational barrier: transplanted cells often showed poor survival, limited engraftment, and inconsistent differentiation *in vivo*. Dr. Kam Leong helped overcome this challenge by demonstrating that therapeutic success depends not only on the cells themselves but also on the biomaterials and microenvironments that support them. Through pioneering work on natural polymers, fibrous scaffolds, and biomaterial design, his group showed that engineered matrices can provide structural support, enhance cell survival, and promote lineage-specific differentiation. Equally important, his research revealed how biophysical cues—including nanotopography, substrate stiffness, and other features of the cellular microenvironment—shape stem cell behavior and modulate immune responses. In doing so, Kam helped redefine regenerative medicine as an integrated discipline in which cells, materials, and host biology must be designed together. His legacy is not only a body of influential work but also a translational vision that continues to shape the future of bioengineering and regenerative medicine.

Suzie H. Pun
University of Washington

Biomaterials pioneer whose mentorship shaped generations of scientists committed to excellence and integrity

I have the greatest respect and admiration for Dr. Kam Leong. He is not only an accomplished scientist and engineer but one who lives his life with integrity and a commitment to the pursuit of truth. I first met Kam when I was a graduate student in Mark Davis's group entering the field of nonviral gene and drug delivery, the field where Kam was already one of the established leaders. Kam's team was not only developing new polymers and drug delivery formulations but also answering important mechanistic questions in a quantitative manner that propelled the whole field forward. Kam's impact is amplified in the high qualities of his trainees, many of whom are now also major leaders in industry and academia and who also uphold his high scientific and integrity standards.

Jun Wang
South China University of Technology

Revolution in biomaterials and gene delivery: An indelible mark on translational medicine

Professor Kam W. Leong's pioneering legacy lies in building a transformative intellectual foundation for biomaterials, drug delivery, and bioengineering that will continue to shape the field for decades to come. His groundbreaking work on oral gene editing opens up a minimally invasive route for systemic delivery of genomic medicines, overcoming a major translational barrier and enabling patient-friendly therapies for genetic and inflammatory diseases. The enduring impact of Gliadel exemplifies his vision of localized, sustained, targeted therapy, inspiring next-generation scaffolds for regenerative medicine and onco-surgery. His rigorous studies on cationic biomaterial-nucleic acid interactions laid the groundwork for immunoengineering and *in vivo* cell reprogramming. By enabling precise delivery of mRNA, siRNA, and CRISPR machinery, he created a versatile platform for anti-inflammatory treatment, cancer vaccination, and gene correction. Guided by biological insight and clinical needs, his design philosophy remains a powerful blueprint for translating advanced materials into real-world medicine.

Chunying Chen
National Center for Nanoscience and Technology of China

Visionary who transformed passive biomaterials into active therapeutic systems, redefining drug delivery and regenerative medicine

Kam's pioneering work in nonviral gene delivery and therapeutic biomaterials demonstrated that material structure and chemistry can shape cellular responses, establishing materials as active components in therapeutic systems. I vividly recall discussing anti-inflammatory biomaterials with him beside the Beijing National Stadium ("Bird's Nest"), where he used the stadium's intricate design to illustrate how scaffold architecture guides biological function, reflecting his deep understanding that structure determines function.

Kam consistently engages in open and equal discussions with early-career researchers. During visits to our institute, he dedicates at least half a day to meeting young scientists, carefully listening to new ideas and offering insightful guidance on emerging research directions. His mentorship expands academic horizons and helps young scientists identify the most critical challenges in their work.

He also champions interdisciplinary research and international collaboration. He encourages early-career researchers to tackle biomaterials problems from multiple perspectives, broadening their horizons and energizing the field. He works tirelessly to advance innovative studies while nurturing the next generation of internationally competitive scientists. His combination of scientific excellence, visionary thinking, humility, and generous mentorship continues to inspire the biomaterials community worldwide.

Hon Fai Chan
The Chinese University of Hong Kong

A pioneer in biomaterials and nanomedicine and a respectable mentor

Dr. Leong is a pioneer in biomaterials and nanomedicine whose work has fundamentally shaped the field. His influence is evident in his highly translational research, such as serving as a key inventor of the Gliadel wafer, which has transformed brain cancer treatment. He was also an early leader in nonviral gene delivery, a prescient insight now validated by the success of mRNA vaccines. Yet beyond his scientific achievements, what truly distinguishes Prof. Leong is his approach to leadership and mentorship. He has earned deep respect across the scientific community with his humility and kindness. As a mentor, he grants students the freedom to pursue novel research, offering support and encouragement that has continued long after I graduated. Now an independent investigator myself, I still feel the support from Prof. Leong, whom I view as my mentor but also as a dear friend. At conferences, he always asks about my research and offers me advice. He also cares about my personal life and even made the effort to travel to Hong Kong to attend my wedding. Overall, his legacy will inspire the next generation of bioengineers, ensuring that his impact lies not just in his research achievements but also in the careers he shaped.

Antonios Mikos
Rice University

Pioneering contributor to biomaterials-based controlled release systems

Dr. Leong's work established key principles for biomaterial platforms capable of regulating the spatial and temporal presentation of biological signals, an approach now central to drug delivery and regenerative medicine strategies.

Through the design of biodegradable polymers, polymeric nanoparticles, and gene-activated scaffolds, Dr. Leong advanced controlled release strategies that enabled sustained and localized delivery of biomolecules, including nucleic acids and proteins. These systems demonstrated how engineered biomaterials could protect small molecule stability, control release kinetics, and enhance cellular uptake, addressing major barriers in gene therapy and tissue engineering. His research further showed that biomaterials could function not only as delivery vehicles but also as instructive microenvironments that guide cell behavior and tissue repair.

Importantly, Dr. Leong's work created translational pathways for therapeutic development by addressing challenges such as stability, targeted delivery, and controlled release. Looking ahead, the principles he established will continue to guide biomaterials for emerging agents, including small bioactive peptides, extracellular vesicles, and nucleic acids, enabling more precise and effective next-generation biomedical therapies.

Annie Tang Gutsche
Corteva Agriscience

Outstanding mentor and human, exemplified by his kindness to others

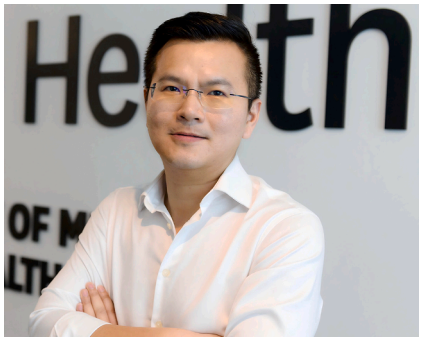
Training under Kam was my introduction to interdisciplinary thinking in action. It is easy to forget now, but when his lab was getting started, fields like biomedical engineering occupied an uncomfortable middle ground—neither fully medicine nor engineering—and were viewed with skepticism in both academia and industry. Kam worked to dispel those beliefs by investing in collaborations across divisions and disciplines to demonstrate what was possible at the interface. In doing so, he provided his students with great freedom to choose their projects and directions, and he created space for us to find our paths. He cultivated a culture of collegiality within the lab too, so it was clear that collaboration was not just an external strategy but an internal value.

That foundation has proven enduring. Though my career has taken me in a completely different direction, I still work in an interdisciplinary area. I am often struck by how naturally my training under Kam surfaces as I work to integrate perspectives across domains of science, regulations, business, and industry needs. The interdisciplinary instinct and collegiality he modeled are the most transferable skills I carry.

Kas Subramanian
Differentia Biotech Ltd.

Creating a nurturing, multidisciplinary, and collaborative environment that fostered innovation

If I reflect back on my time at the Leong lab at Johns Hopkins University, what I remember most is Kam's unwavering support throughout my doctoral journey. Even though the core of my research fell outside his primary area of expertise, he never hesitated to dive into my work with me, offering direction when I needed it, time, and the guidance necessary to navigate its challenges. His warmth and openness created an environment where I felt comfortable sharing both my breakthroughs and my setbacks. Beyond research, he served as an invaluable sounding board for my post-PhD options, helping me weigh career paths with genuine care for my future. I most appreciate him for fostering a lab culture where individuals from diverse backgrounds were not just welcomed but encouraged to work in a collaborative, helpful atmosphere. This spirit of cooperation made the lab a true community, and I am a better researcher for having been a part of it.



Bingyang Shi
University of Technology Sydney

A mentor whose quiet wisdom shapes not only how we do science but who we become as scientists

I still remember the first time I discussed research ideas with Kam Leong. What struck me the most was not just his depth of knowledge but his clarity and calmness. He listened carefully, distilled complex problems to their essence, and offered insights that were both simple and profound. That moment stayed with me and continues to influence how I approach science today.

Kam's scientific contributions to biomaterials and gene delivery are widely recognized, but what truly sets him apart is his mentorship. He creates an environment where you feel encouraged to think boldly yet guided with precision. He never imposes ideas; instead, he asks the right questions, the questions that challenge you to refine your thinking and grow.

His influence is subtle but enduring. Long after a conversation ends, you find yourself thinking differently, working differently, and mentoring others differently.

To me, Kam's legacy is defined not only by the technologies he helped pioneer but by the countless scientists he has shaped quietly, generously, and profoundly.

Chris Grigsby
Queen's University Belfast

Small science, big impacts

While much of Professor Leong's pioneering research in biomaterials engineering over the last half-century has focused on the nanoscale, its impacts have been decidedly more macroscopic. Through the development of polymeric nanomedicines and nanostructured materials for tissue engineering, Dr. Leong has not only advanced the scientific foundations of our field but also translated these innovations into meaningful improvements in patient care. What truly distinguishes him, however, is the generosity, sincerity, and humility with which he leads his teams. Whether sacrificing sleep for long discussions deep into the witching hours or traveling across states simply to support students presenting work he has already helped them refine, Dr. Leong exemplifies unwavering dedication to his trainees. When his name arises in conversation, it is telling that the first praise is seldom for his well-documented brilliance or accolades but almost invariably for his kindness. His example affirms that excellence in science need not come at the expense of prioritizing the people behind it. From small seeds grow mighty trees, and as members of Dr. Leong's academic arbor continue to emulate his mentorship in their own careers, the next generation of biomaterials scientists he trained will amplify his influence and impacts for many years to come.

Catherine Le Visage
Nantes University

Never-ending passion for science

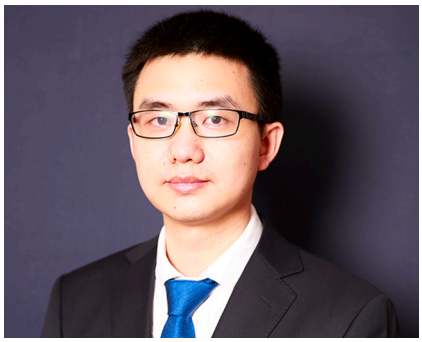
When I started my postdoctoral work at Johns Hopkins University, many questioned my decision to move from Paris, the City of Lights, to Baltimore, a city with a less-than-stellar reputation. Not only have I truly valued living there for 5 years, but joining Dr. Leong's lab proved to be a pivotal step in my scientific journey.

Kam played a crucial role in my desire to pursue a career in academia. His ability to deliver meaningful, constructive insights in a gentle manner and to foster a supportive, collaborative lab environment where everyone can thrive was inspiring. His mentorship guided me into a pioneering tissue engineering project at a time when the field was still emerging. Our early work, which combined hydrogels and stem cells to regenerate the intervertebral disc, has shaped my scientific perspective and long-term path, and I now find myself a member of a global research community working on this topic. I truly appreciate that Kam showed me that the freedom to explore new ideas is one of the greatest rewards of being a scientist.

Ankur Singh
Georgia Institute of Technology

Visionary who reshaped how we think about biomaterials as active, instructive partners in human biology

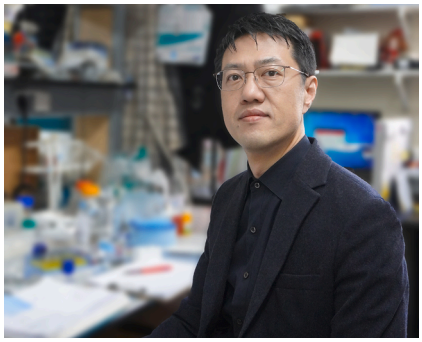
Kam's work anticipated a future where materials do more than deliver; they communicate, adapt, and direct cellular fate. In engineered drug delivery and nonviral gene transfer, he moved the field beyond incremental optimization toward a fundamentally new paradigm, designing systems that engage with cells at the molecular level to orchestrate uptake, trafficking, and expression with precision. What distinguishes Kam is not only technical mastery but also a systems-level intuition: an ability to see connections among materials, cells, and clinical needs before they become obvious to others. Much like the most transformative figures in bioengineering, he has consistently operated ahead of the curve by translating fundamental insights into platforms that redefine therapeutic possibilities. Over the next decade, his influence will be felt in the rise of adaptive, intelligent biomaterials, technologies that sense and respond to biological context in real time. As the field converges on immunoengineering, regenerative medicine, and precision therapeutics, Kam's legacy will endure in the very way we design interventions: not imposed upon biology but integrated with it.



Mingqiang Li
Sun Yat-Sen University

Fearless curiosity and empowering mentorship

Kam exemplifies the essence of academic passion, combining fearless curiosity with a profound commitment to mentorship and scientific impact. A pioneering figure in biomaterials and bioengineering, he has contributed to nonviral gene delivery, regenerative medicine, and translational nanotechnology in ways that have significantly advanced the field, consistently bridging rigorous engineering principles with meaningful clinical applications. Yet his influence extends far beyond research achievements. He leads not through authority but through example, demonstrating that true leadership lies in fostering curiosity, integrity, and perseverance. His mentorship is defined by a rare balance of intellectual rigor and genuine compassion. By encouraging independent thinking while providing steady guidance, he empowers trainees to explore bold, high-risk ideas without fear of failure. His incisive questions often reshape perspectives, reinforcing the importance of clarity and critical thinking as the foundation of innovation. Equally important is his unwavering belief in his students, creating an environment where individuals are supported in finding their own voice and confidence. His open-door philosophy and generous spirit cultivate not only skilled researchers but also thoughtful, purpose-driven scientists. Ultimately, his legacy is reflected not only in groundbreaking discoveries but in the generations of scientists he has inspired to pursue impactful, translational research with courage and conviction.



Hyuk Sang Yoo
Kangwon National University

He used his brilliant mind to turn "simple" materials into lifesaving tools

Kam's research has transformed biomedical engineering by turning passive materials into "intelligent" therapeutic tools. As a pioneer in nanomedicine, he developed polymeric nanoparticles that safely deliver genetic material, a milestone for modern gene therapy and oral drug delivery. His discoveries in cell-topography interactions shifted the focus of regenerative medicine from purely chemical signals to structural engineering. He revolutionized the treatment of autoimmune diseases by engineering molecular "scavengers." These biomaterials physically trap inflammatory triggers, acting as a "sponge" to neutralize disease without drugs. He has bridged the gap between engineering and the clinic, creating a future where materials actively heal the body.

Kam's journey has transformed modern medicine by turning the complex biology of the human body into a solvable engineering challenge. At the heart of his story is the creation of "smart" biomaterials, which didn't just stay in the lab but moved into the clinic as the Gliadel wafer. This shift from systemic treatment to localized, steady-release medicine has profoundly improved patient care by minimizing harsh side effects. His narrative continues into the frontier of gene therapy, where he championed a safer nonviral approach. He engineered synthetic nanoparticles that act as reliable delivery trucks, making "gene-as-a-drug" a tangible reality and even opening the door for oral DNA vaccines.

Krishnendu Roy
Vanderbilt University

Kam's enduring legacy is "impact with humility"

Kam's work in drug and gene delivery using nonviral vectors and in cell-material interactions has served as the basis for many discoveries and innovations worldwide. He was one of the first to develop polymeric nanocarriers for nucleic acid delivery, and the current success of nonviral mRNA delivery largely rests on his and other pioneering scientists' work.

Personally, I owe my career to Kam. I was an instrumentation engineer when I joined Hopkins as a PhD student. I remember walking into Kam's office and asking him if I could rotate in his lab to gain exposure to a completely different field: cells, molecules, and materials. I had never touched a micropipette before that time. I was an electrical circuits guy. Kam took a chance on me that most faculty today will never take! The rest is history; I never did my other rotations and stayed at Kam's lab—learned completely new skills from scratch and carved out an entirely new career. I am deeply grateful for that moment of trust. Kam always leads from behind, never in the spotlight, never bragging, never standing up at a conference to boast or declare superiority. He always gave

credit to students, fellows, and collaborators. He is one of the humblest scientists I know.

Hunter Chen
Biopharma Industry

A mentor who cultivates scientific curiosity and the courage to take on bold ideas

Kam's mentorship style for his lab can be likened to tending a garden. Starting with seeds of ideas, he provides the resources and fosters an environment that enables his students to grow these ideas and, at the same time, learn to be independent critical thinkers and resilient scientists. He encourages taking risks and moving ideas into new directions. He guides his students to rigorously investigate challenging scientific questions. While not all bold ideas succeed, others do bloom under his mentorship to become new discoveries or contributions that advance the field.

Michael Haller
MH Consulting

Leong's legacy: Shaping many lives through rigor

In one's life, one crosses paths with many people. Only a handful of people stand out. Dr. Kam Leong is one of the few who made a major impact on my life.

Dr. Leong was the best mentor a young graduate student could ask for. He cared deeply about the students and staff in his laboratory—both scientifically and personally. When faced with difficult to interpret or even discouraging results, he guided his students with scientific rigor and integrity so that they would persevere and succeed.

He welcomed me into his lab as a transfer student even though there were logistical challenges. Midway through my doctoral research, I realized that my future lay not in research or academia but in pursuing management consulting after completing my PhD. I dreaded having the conversation with Dr. Leong, expecting disappointment. Instead, he responded with genuine support and encouragement. His confidence in me gave me the courage to pursue this different path and ultimately succeed on the business side of science. I remain grateful to Dr. Leong for his guidance, compassion, and unwavering belief in his students.

Hongxia Wang
Vertex Pharmaceuticals

A pioneer who redefined biomaterials as engines for therapeutic innovation

I had the privilege of conducting my postdoctoral research from 2015 to 2019 in Professor Kam W. Leong's lab at Columbia University, where I worked on nonviral delivery systems for gene editing and drug delivery. My work was deeply influenced by his vision of using biomaterials not just as carriers but as enabling platforms for precise and effective therapeutics. What distinguishes his scientific approach is the ability to connect fundamental material design with real translational potential. He consistently emphasized designing systems with a clear path toward biological function and clinical relevance. This mindset shaped how I approached my own research—focusing not only on delivery efficiency but also on the potential for translational and applicability. Equally impactful is his mentorship legacy. His influence fostered independence, critical thinking, and a strong sense of purpose in translating science into impact. His work continues to inspire my transition from academic research into biologics development, where the goal remains the same: turning innovative science into meaningful therapies.

Gloria Kim
Florida Semiconductor Institute

A mentor who shows that excellence and humility belong together

I was Dr. Leong's student from 1998 to 2001 at Johns Hopkins University. Coming from a chemistry background rather than engineering, I initially struggled to find my footing as a student researcher. One day, he reached out first to ask how I was doing. That simple gesture gave me the confidence to join his lab, where I learned that research requires patience, composure, and the ability to move forward without overreacting to temporary setbacks.

Despite his accomplishments, he never allowed hierarchy to define his relationship with students. He created a research environment where questions were welcomed, uncertainty was accepted, and students were treated with quiet respect and patience.

What continues to influence me most is Dr. Leong's humility. He is candid about the limits of his own expertise and never assumes that mentorship requires having every answer. Instead, he models honesty, calm judgment, and trust in each student's capacity to grow. In my own work at the intersection of biomedical engineering and engineering education, I have come to appreciate the enduring influence of his example on my professional philosophy. Adaptability, openness to new intellectual directions, and unwavering respect for the growth of each mentee remain defining qualities I continue to associate with his mentorship.

Jiyoung M. Dang
Abbott Medical

Kam's legacy: Global leaders driven by curiosity

Kam Leong's mentorship is rooted in a commitment to intellectual autonomy. He curates a lab culture where the freedom to explore original ideas is balanced by rigorous, constructive dialogue. In this environment, concepts are vetted through collective critique, ensuring that every discovery is as robust as it is creative.

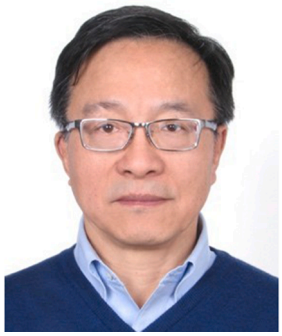
Beyond the bench, Kam is a true advocate for professional advancement. By empowering his students to publish and present their work, he ensures their contributions gain the visibility they deserve. For the many of us who trained under him, he has transitioned from an advisor to a lifelong career sponsor, consistently opening doors to his global network.

In the years since graduating, I have realized that the most enduring lesson from Kam's lab was not the technical knowledge but a specific way of thinking. He taught me to distill complex problems into elegant, efficient solutions. This balance of creative ambition and grounded pragmatism has become the foundation of my own career growth. Today, I approach every challenge as both a critical and creative problem-solver—a mindset that provides the confidence to navigate high-stakes environments and deliver results that work in the real world.

Aliasger K. Salem
University of Iowa

A pioneering biomaterials scientist and mentor who shaped the field of gene delivery

I had the privilege of training with Kam Leong at Johns Hopkins School of Medicine, where his influence on my scientific trajectory was both foundational and enduring. Kam's research helped define the modern paradigm of biomaterials as active, instructive systems rather than passive carriers. During my postdoctoral work, we collaborated on a DARPA-funded project developing multifunctional nanorods for gene delivery. That work contributed to early recognition that CpG motifs, when codelivered within engineered systems, function as potent immunostimulatory adjuvants—an insight that has shaped my own research program for over two decades and is now translating clinically. What distinguished Kam scientifically was his ability to integrate engineering precision with biological intuition. He approached problems mechanistically, yet always with an eye toward real-world application. Equally important was his mentorship: he cultivated independence while setting uncompromising standards for rigor and clarity of thought. He trained scientists to think deeply, communicate precisely, and pursue questions that matter. Kam's legacy is reflected not only in seminal contributions to biomaterials and gene delivery but in the many trainees who have extended his impact across academia, industry, and medicine.



Gang Bao
Rice University

Professor Kam Leong has transformed the biomaterials and bioengineering fields

Kam is an exceptional leader in biomedical engineering who has made pioneering contributions to drug and gene delivery systems and bionanotechnology, with a profound impact on both the profession and society. He has been a wonderful colleague and a dear friend of mine for more than 30 years. Kam is always kind and humble, eager to help others—especially young people around the world. Through his innovative research, outstanding leadership, and strong commitment to translation, Kam will have a huge influence on shaping the next decade of biomaterials and bioengineering. Happy birthday, Kam!

Helen H. Lu
Columbia University

Scholar and mentor

One of the first papers I read from Kam's impressive body of scholarly work was on chitosan nanoparticles as gene carriers, which was published in 2001 in the *Journal of Controlled Release*. At the time, we were exploring chitosan as a hydrogel for dental pulp regeneration and were attracted to its reported antimicrobial properties. What struck me then was how much ahead of the time that paper was, while folks are still tinkering with hydrogels, Kam is already decades ahead. Coincidentally, this paper is also one of Kam's most-cited papers. This small example is typical of how Kam, as a scholar, is always at the leading edge of the field, pushing the boundary and transforming what we know and think about drug delivery and biomaterials. His exemplary record as a mentor notwithstanding, I am especially grateful to Kam for his kindness and generosity toward junior colleagues and mentees, and this is the case across all the institutions that he has called home. Kam always makes time to meet, no matter how busy he is. And his advice is always golden. By his example, Kam inspires us to always pursue meaningful work and be the best mentor possible.

DECLARATION OF INTERESTS

S.L., A.K., and H.H.L. are advisory board members of *Cell Biomaterials*.