UCLA TECHNOLOGY DEVELOPMENT GROUP

UCLA Technology Development Group

INNOVATION MAGAZINE

JULY 2021 | VOL 8

TDG.UCLA.EDU

UCLA Technology Development Group

INNOVATION MAGAZINE

JULY 2021 | VOL 8

INNOVATION MAGAZINE
JULY 2021 VOL 8

Editor:
Marivi Valcourt

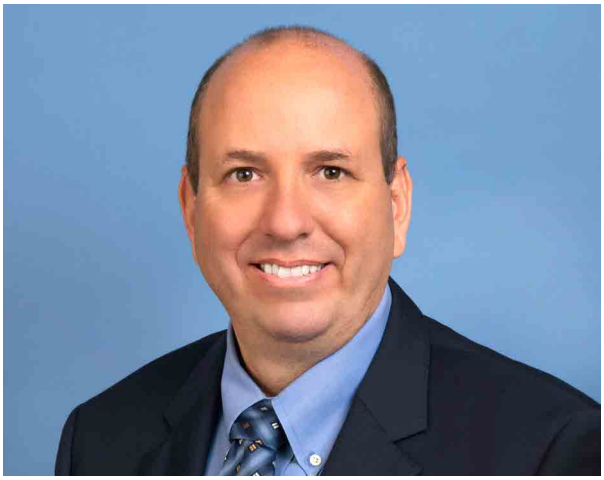
Contributors:
Tiare Dunlap
Deanna Evans
Tom Lipkin
William Looney
Carol Lopez
Dina Lozofsky
Greg Markiewicz
Amir Naiberg
Christine Wei-li Lee
Mark Wisniewski

Designer:
Jennifer Cogan

Front Cover:
Royce Goes Rainbow for Pride Month
Photo UCLA Newsroom

TDG.UCLA.EDU

CONTENTS



Amir Naiberg

UCLA TDG

A message from **Amir Naiberg**

Dear Readers,

Despite the pandemic, we had a very productive year with the UCLA Research community and the UCLA TDG team working in overdrive, meeting the many challenges before them, and reaching another record year in industry sponsored research and commercialization activities.

According to OUP, UCLA spinout companies raised more than $740M over the past year. Many of UCLA spinout companies including Appia Bio and Flex Logix, were able to attract millions of dollars that advances their important work. Recently, two UCLA spinouts were recognized in The Science Coalition report as generating thousands of regional and national jobs. Then, there is the UCLA CarbonBuilt team, led by Professor Gaurav Sant, who won the prestigious NRG Cosia Carbon XPrize of $7.5M that will further the work of turning carbon dioxide into concrete.

Research continues to take leaps and bounds that you can read about in this issue - with Jun Chen's work in wearables and his sign-to-speech device, and Don Kohn's amazing clinical success of curing children born without proper immune systems.

At TDG, we hosted the XR in Arts and Humanities webinar that showcased VR, AR and MR projects from many "North Campus" departments. UCLA TDG also ran two successful virtual conferences that combined, had over 1600 people in attendance, and during LABEST we announced the student winners of the Pearl Cohen Scientific Poster contest. It was a stellar line up of speakers and panels that you can view on our YouTube channel. Make sure you save the dates for MedTech March 8, 2022 and LABEST May 25 and 26, 2022.

Both the UCLA Innovation Fund and Faculty Innovation Fellows program announced their new Cohorts. Plus, we joined fourteen other leading research universities to form the University Technology Licensing Program that will further our licensing efforts.

Finally, I am happy to welcome Mr. Andrei Iancu to the TDC Board. Andrei's years of experience and recent position as the Under Secretary of Commerce for Intellectual Property and Director for the United States Patent and Trademark office are a valuable addition to our campus.

Looking ahead, in September, we plan to resume our in person activities on campus and we are eager to meet friends and colleagues without needing to unmute before we speak!

Sincerely,

Amir Naiberg
Associate Vice Chancellor, CEO and President
UCLA Technology Development Group

John Desjarlais, Ph.D.

xencor.com

Xencor and UCLA enter collaboration to discover and develop novel XmAb® therapeutics

Collaboration joins together Xencor's modular XmAb engineered protein platforms with UCLA's expertise in biology to rapidly create and advance potential new medicines

MONROVIA, CALIF. — Xencor, Inc. (NASDAQ:XNCR), a clinical-stage biopharmaceutical company developing engineered monoclonal antibodies and cytokines for the treatment of cancer and autoimmune diseases, and UCLA TDG announced an agreement to develop novel therapeutic antibodies, pairing novel targets proposed by scientists at UCLA and utilizing Xencor's modular suite of XmAb® technology platforms. Xencor and UCLA have established a streamlined framework to select promising biology, perform collaborative research and license intellectual property.

Xencor's XmAb platforms are precisely engineered antibody Fc domains, which enable the creation of stable new protein structures, such as bispecific antibodies and engineered cytokines, or amplification of natural immune functions, such as extending circulating half-life or enhancing immune cell cytotoxicity. Xencor and its pharmaceutical partners are now advancing 22 clinical-stage XmAb-engineered drug candidates for the treatment of patients with life-threatening and debilitating diseases. Two of these antibodies have been approved by the U.S. FDA, one for the treatment of patients with rare blood disorders and the other for an aggressive form of non-Hodgkin lymphoma, and an investigational anti-SARS-CoV-2 antibody engineered with XmAb technology, sotrovimab, has received emergency use authorization for treatment of mild-to-moderate COVID-19 in high-risk adults and pediatric patients.

> **"The creation of exciting new therapeutic modalities requires advancing innovative biological concepts together with state-of-the-art molecular platforms to build best-in-class biologics."**
>
> ***– John Desjarlais, Ph.D.***

"The creation of exciting new therapeutic modalities requires advancing innovative biological concepts together with state-of-the-art molecular platforms to build best-in-class biologics," said John Desjarlais, Ph.D., senior vice president and chief scientific officer at Xencor. "The inherent modularity and stability provided by our XmAb platforms, and our ability to precisely

tune a molecule's target-binding capability, opens the door to evaluate the clinical potential of biology that was previously considered intractable. We look forward to collaborating with UCLA's investigators to translate their biological insights into potential medicines."

UCLA TDG, the tech transfer office for the university, will work with faculty to propose potential antibody drug candidates. For selected candidates, the collaborators will use a framework with predefined terms to enter sponsored research agreements and potential license agreements.

"Many revolutionary medical breakthroughs discovered by UCLA's world-class investigators have vastly improved the care of patients, including engineered T cells, therapeutic antibodies and small molecules that are now approved to treat many types of cancer," said Amir Naiberg, associate vice chancellor, CEO and president, UCLA TDG.

"With this collaboration, we aim to accelerate the development of potential new biologic medicines, leveraging Xencor's protein engineering technologies and expertise and the ongoing scientific discoveries and insights into disease biology made at UCLA, with the ultimate goal to improve patient outcomes and quality of life," added Mark A. Wisniewski, senior director, biopharmaceuticals, UCLA TDG. **IM**

xencor.com

Jun Chen *UCLA Samueli School of Engineering*

Catch up with wearables expert **Jun Chen**

UCLA TDG checks in with Jun Chen, who was recently named as one of *In Vivo*'s 2021 Rising Leaders. Chen is an assistant professor in the bioengineering department at UCLA Samueli School of Engineering and an expert in the wearable space where clothing and technology intersect.

How has your experience with developing new innovations been going so far at UCLA?

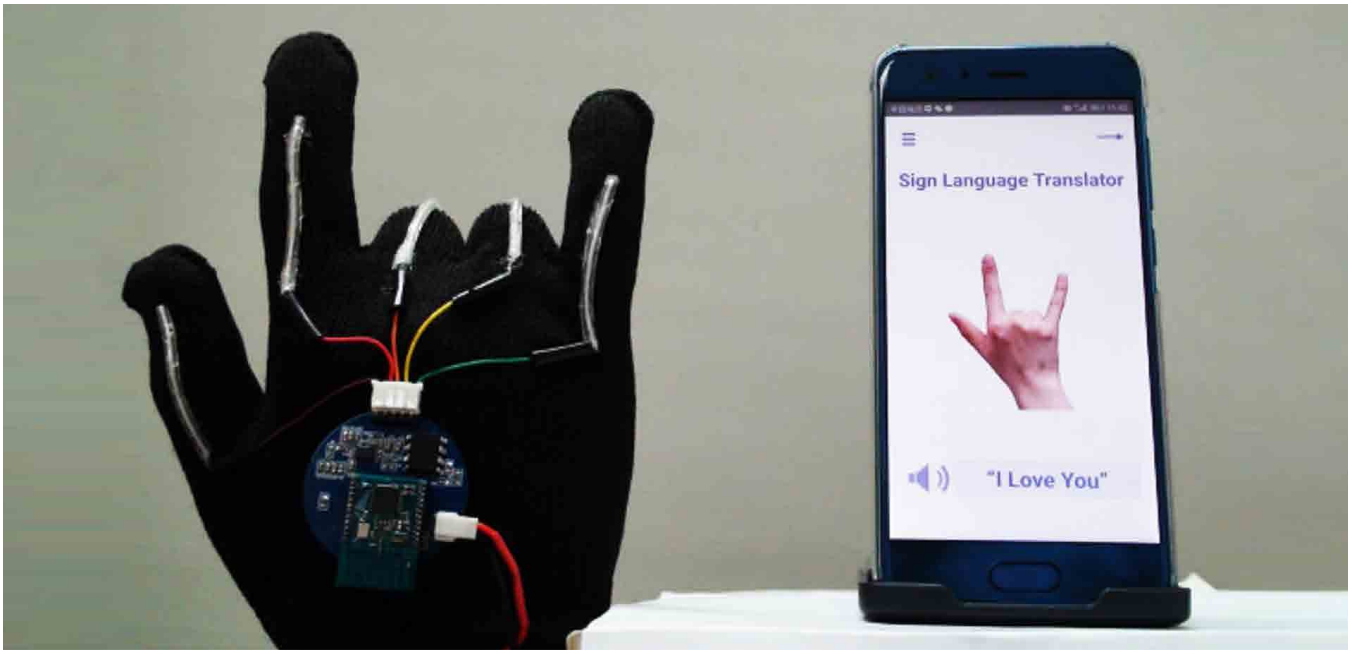
UCLA is a great university with a collection of great locations, great weather, and certainly great minds. As a world-leading research university, UCLA definitely is a great place for science and technology innovation.

What are some of the exciting research/ innovations that you are currently working on (that you can discuss) and what's next for you?

The current research of our Wearable Bioelectronics Group at UCLA Samueli's Bioengineering Department focuses on nanotechnology and bioelectronics for energy, sensing, and therapeutic applications in the forms of smart textiles, wearables, and body area networks. In the past years, we keep pumping out a number of very interesting works in the wearable bioelectronics territory.

For instance, our work on wearable, sign-to-speech translation using machine-learning-assisted stretchable

Sign-to-Speech sensors *UCLA*



Sign-to-Speech App

UCLA

> One of my core research philosophies is that I am always trying to translate scientific research into practical products to make a practical impact and really change the world. "
>
> *– Jun Chen*

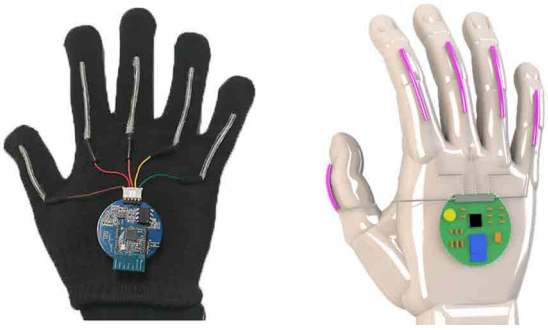
sensor arrays was published in Nature Electronics. This work was highlighted by *Science*, NPR, and more than 200 other media outlets, including ABC, CNN, NBC, UCLA, UC News, and *ScienceDaily*. It was also selected as one of the Top 10 Science Stories of 2020 by Ontario Science Centre. As 2020 drew to a close, the Ontario Science Centre rounded up 10 science gems based on the criteria that they "push the boundaries of science to help us learn about our past, benefit our future, and add wonder to our present." The Centre shared our work during a BT tv interview. This work was also selected as one of the *Altmetric*'s Top 100 Articles. *Altmetric* tracked 87.7 million mentions of 3.4 million articles in 2020 and selected 100 most-discussed pieces across 20 disciplines.

More recently, we discovered the giant magnetoelastic effect in a soft bioelectronic system and invented a fundamentally new technology for biomechanical-to-electrical energy conversion. The soft bioelectronic is biocompatible and can also operate stably on sweaty skin without reliance on any encapsulation. This advance opens up new avenues for human-body-centered energy, sensing, and therapeutics in the era of the Internet of Things, or IoT.

Why are you interested in patents/commercializing technologies that you develop in the lab?

It's important to keep discovering something new in order to push science forward. One of my core research philosophies is that I am always trying to translate scientific research into practical products to make a practical impact and really change the world.

Find out more about Chen by visiting the Wearable Bioelectronics Research Group website. **IM**



Sign-to-Speech wearable glove

UCLA

Amit Sternberg

Rubato

MedTech and Music

Amit Sternberg attended the UCLA MedTech Partnering Conference 2021 (UCLA MedTech 2021) with the intention to network. But due to the pandemic, things were different – the event was completely virtual. Undeterred, Sternberg took advantage of all the tools that were available, including the Jujama Partnering App, and completed his profile and a profile for his company, Rubato.

Frank Ahmann, a 30 year veteran of the biotech and medtech industries, also attended UCLA MedTech 2021 to network and possibly connect with an interesting start-up. Frank also used the tools available to search through company profiles when he happened upon Rubato's profile. Needless to say, Rubato struck a chord.

"The event [UCLA MedTech 2021] was a perfect fit and it went very smoothly. Your platform was very convenient to work with and scheduling the calls and following up was easy. I see it as a huge success and win-win for Frank and me and the company," commented Sternberg.

Rubato is an innovative technology company that matches music to the listener's physiological and psychological state. The technology quantifies and measures music effects on humans specifically noting the biometrics that indicate stress levels. The AI analyzes which musical attributes trigger stress and then serves music that will aim to de-stress you.

But everyone is unique and responds to music differently.

"Early on I tested my theory and chose a Schumann concerto and a loud rock piece that featured distorted guitars. When I listened to Schumann the data showed that I was at a relaxed state and when I listened to the rock piece my stress levels rose," said Sternberg "But it was the opposite for my 17 year old son. When he listened to Schumann, his stress levels rose but when he listed to distorted guitars the data showed he was less stressed."

> **"The event [UCLA MedTech 2021] was a perfect fit and it went very smoothly. Your platform was very convenient to work with and scheduling the calls and following up was easy. I see it as a huge success and win-win for Frank and me and the company."**
>
> ***– Amit Sternberg***

Amit Sternberg is Rubato's CEO. Originally a trained pianist, he studied music and philosophy at Hebrew University in Jerusalem and was active in the Israeli entertainment scene for years. But he's also been a serial entrepreneur for 20 years establishing several

Rubato

companies and the idea of Rubato has been with him for a while.

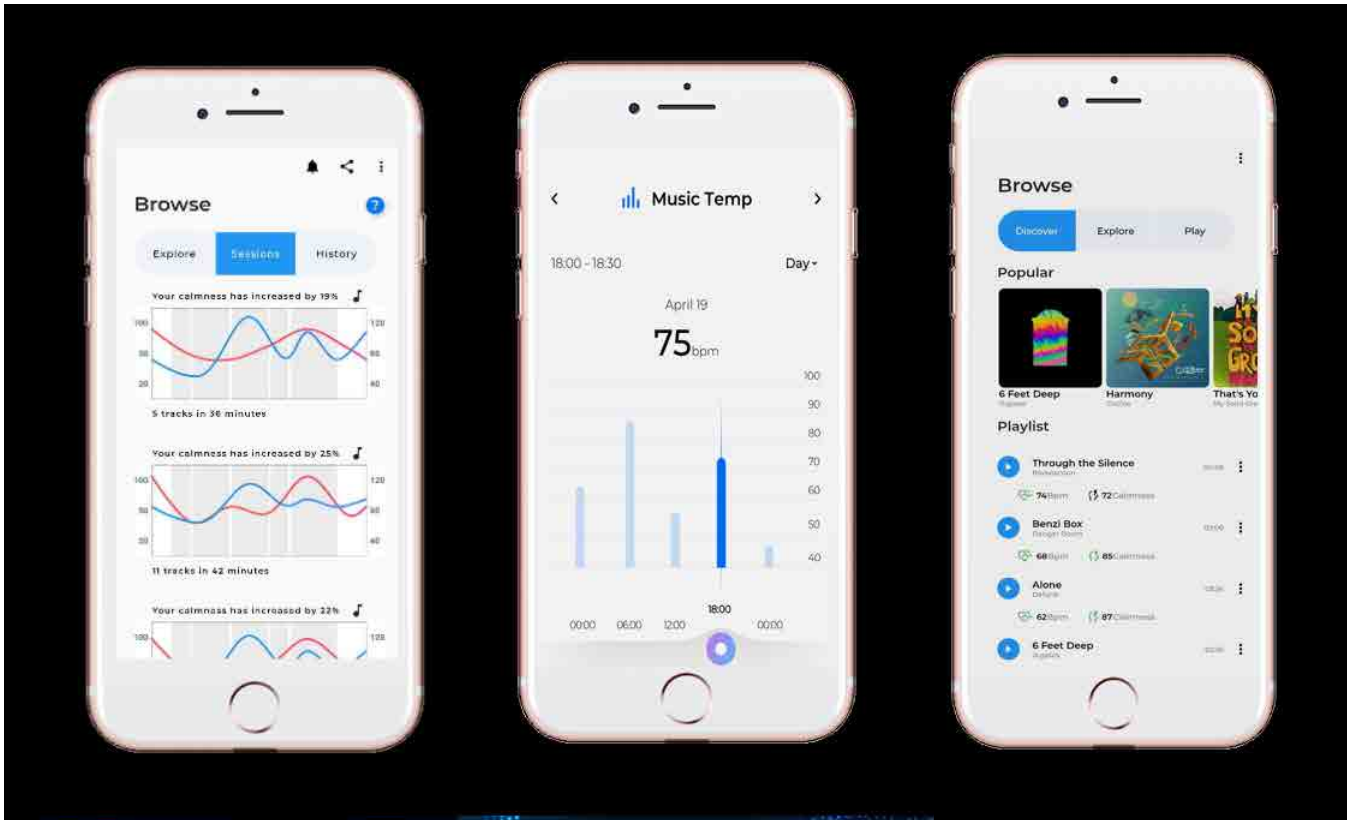
"It was obvious to me that the time has come for us to be able to recommend music to the listener based on their psychological and physiological need rather than by algorithm which aims to promote certain content or to sell more of a certain artist," said Sternberg. "I've had this vision for at least 10 years and now, many of the wearables can measure quite accurately especially cardiac indications to get good data feeds. And AI is much more accessible and easy to implement. Plus we've developed an app with a great dashboard"

Sternberg along with Ahmann, who now sits on Rubato's advisory board, are working with different wearable companies to integrate the data collection and analyzation directly from the clothing to the app. The team is also working to bring Rubato's technology to the clinical level where providing music to patients will actually help in their recovery and well-being.

In addition to raising VC funds to get the company to the next stage, the organization is working towards strengthening the scientific validation for FDA clinical approval. There are trials planned at UCSF and Boston University. Rubato is also working to commercialize the product for use in the wearable apparel industry.

Sternberg states "We are great believers in the power of music. It influences emotion, stress level, physiology and it's a huge trend and that's the place we come from. It's time to enable music and boost its capabilities to be used in a much better and efficient way to help people live better lives."

"Being a musician – I knew that music has an effect on me. But the challenge facing us was 'How do you scale up? How do you measure? It's a huge issue and I think we are doing a great job and we will soon get there." **IM**



Rubato App Dashboard

Rubato

In Vivo

Academia Meets The Market - Part One

By William Looney

In the two part series "Academia Meets The Market" In Vivo's William Looney interviews Amir Naiberg, associate vice chancellor and CEO & president of UCLA Technology Development Group to discuss the growth and strategy of tech transfer at UCLA through research, investments, partnerships, and programs. Part One follows below and a link to Part Two is at the end of the article.

NEW DRUG DEVELOPMENT IS AN INCREASINGLY COMMUNAL ENTERPRISE. In Vivo examines how one major US academic institution – the University of California, Los Angeles (UCLA) – is expanding its range of research contacts to open new areas of therapy and shorten the transition from bench to the bedside. Its commercial impact is considerable: over the past two decades, private-sector VC's have invested more than $2bn in UCLA-backed innovations, with 26 startups launched through the university in 2019 alone. Amir Naiberg, UCLA's point man on technology transfer, explains the factors that have made the university a successful advocate for partnerships that produce results for patients.

Collaborations between industry and academia are a common feature of today's biopharma R&D landscape. Well over half of FDA-approved new chemical entities rely on externally generated research at some point in the journey from discovery to development. Factors driving this trend include academic scientists' focus on the complex biology that underpins pathogenic expression of disease; high costs of in-house industry R&D coupled with financial pressures on universities due to declining public funding support; more transparency on intellectual property standards for tech transfers involving industry and academia; and a relaxation of industry concerns about "open innovation," resulting in a greater tolerance for risk, on both sides. More important, new studies published in the past year on drug industry trends in R&D productivity cite growth in external partnering as one explanation for an uptick in the rate of return on capitalized R&D investment, after decades of decline.

To cast some fresh light on how academia and biopharma are working together to speed the translation of research from bench to bedside, *In Vivo* has profiled one of the academic community's leading sources of technology transfer with industry, the University of California, Los Angeles (UCLA) Technology Development Group (TDG). Now five years old, TDG has unique legal status within the university as an external 501(c)(3) corporation with dedicated responsibility for managing UCLA's IP and licensing portfolio consisting of more than 1,000 active patents, a trove that generated a record $183m in income for UCLA in 2019. In the first three quarters of 2020, UCLA had secured $1.4bn in new research funding, a 20% increase over 2019. More than half – $754m – will be spent on bioscience and other health-related projects for the David Geffen School of Medicine at UCLA. The federal National Institutes of Health (NIH) is the largest single funding contributor, awarding grants worth $565m to projects in AIDS, cancer, neurosciences, cardiovascular disease, COVID-19 and mental health. Industry sponsored research adds another $53m. Overall, UCLA ranks in the top five US academic institutions in research funding, and is first among public universities.

UCLA has a proven record as an innovator in drug discovery. Its research faculty played key roles in the development of three blockbuster cancer drugs: Herceptin (trastuzumab), the first targeted therapy for breast cancer; Gleevec (imatinib), another targeted

therapy for leukemia, which evolved from UCLA researchers' discovery that genetic alterations could cause cancer; and, most recently, Xtandi (enzalutamide), approved by the FDA in 2012 and again in 2019, and now the global market leader in new hormonal therapies for advanced metastatic prostate cancer. Erleada (apalutamide), a drug from Janssen (a division of Johnson & Johnson) approved for the same indication in 2018, also originated in UCLA Professor Michael Jung's biochemistry lab.

On the entrepreneurial side, UCLA has a flourishing start-up culture, with 26 start-ups launched by faculty and associates in 2019 alone. Its commercial relevance is demonstrated by the fact that the private-sector VC community has invested $2bn in UCLA companies during the past two decades. The business focus is reinforced by TDG's board of directors, whose 21 members include seven executives from big pharma and biotech.

To get a closer look at the priorities of this mainstay of tech transfer in the US top-ranked public university, *In Vivo* spoke with TDG's CEO and associate vice chancellor, Amir Naiberg. Having joined TDG in 2016, Naiberg is a veteran of Israel's start-up culture, serving as CEO of Yeda Research & Development Co., the commercial arm of the Weizmann Institute of Science and as co-chair of the Israel Technology Transfer Organization, which helped solidify the country's reputation as the "Start-Up Nation." He remains a strong advocate of moving research more quickly from the lab to the marketplace, and is particularly focused on helping positioning the Los Angeles region as a leader in global life sciences innovation (see "Building the Biotech City," *In Vivo*, July 2019). Naiberg is joined by In Vivo Editorial Advisory Board member, Dr. Ken Schultz, CEO and chair of Trethera Corp., an earlystage biotech based in Los Angeles whose pipeline has also benefited from some of the science conducted in UCLA labs.

In Vivo: *Translational research – turning insights from academic science into clinical advances for patients – is widely seen as the most important change in medical practice of the century thus far. Do we still have further to go in reducing the time lag from the bench to the bedside? How is the UCLA Technology Development Group helping to foster collaborations that really move the needle on new product innovations?*

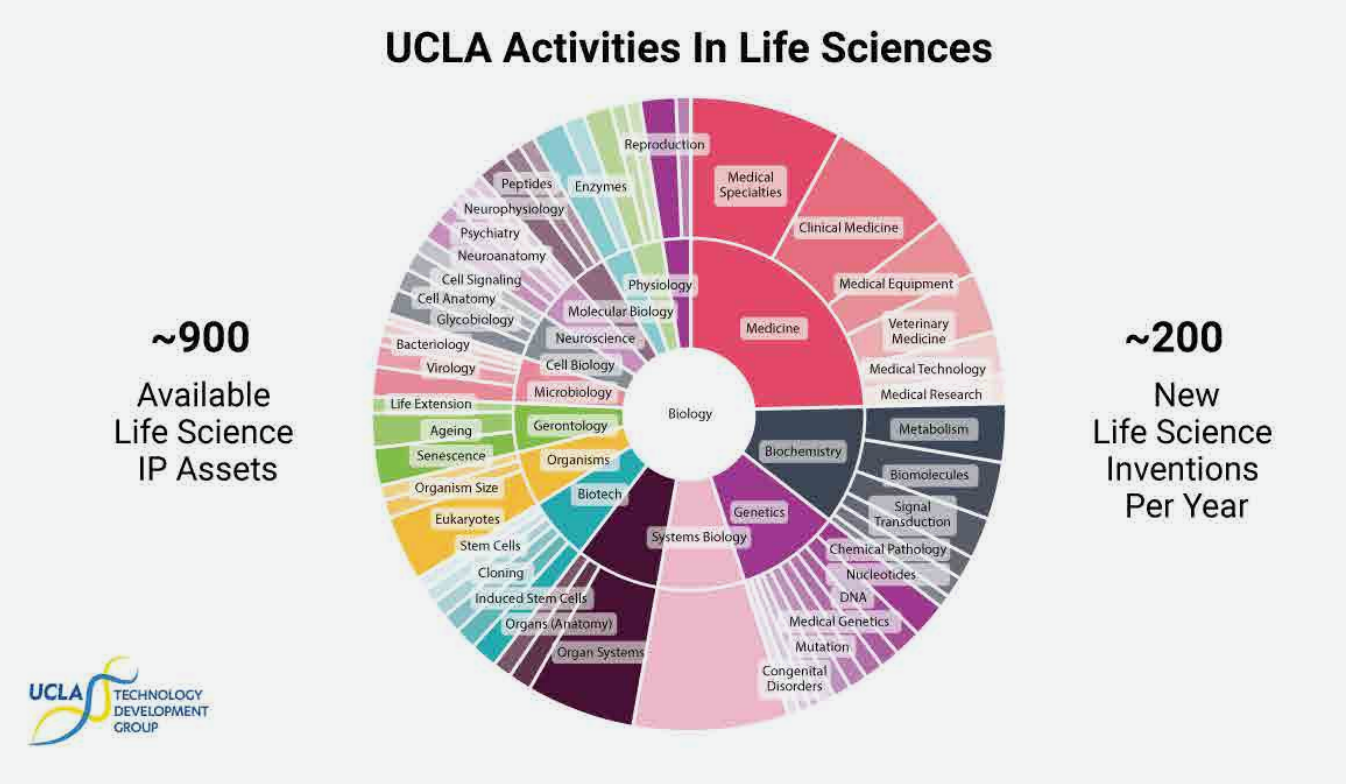
Amir Naiberg: Differences between academia and industry in their approach to research are well documented. There will always be some gaps due to the structure of funding, whereby the federal government supports the basic discovery work of universities while industry relies on private capital to defray the high costs of development. What matters is the incentives that now exist for both groups to collaborate in moving from a knowledge-driven organization to a commercial enterprise.

The Technology Development Corp., the 501(c)(3) established six years ago to oversee TDG's mission, helps UCLA's research faculty bring its life-changing discoveries to the market faster, creating economic value and advancing the standard of care for patients. Of course, making this happen in real-time required some creativity. It was necessary to tie what was a disaggregated flow of research expertise into a coherent framework that would allow us to match this expertise to the best external opportunities. It required a cultural change in that our most productive faculty had a history of pursuing start-up ventures on their own, without leveraging the partnering capabilities embedded within the vast UCLA ecosystem. This year alone, UCLA scientists have received a record $1.4bn in research grants, nearly half of which is earmarked for medicine and the life sciences. Making the world outside our labs aware of that is the essence of what we do.

In Vivo: *Describe the mission and structure of the TDG enterprise.*

Naiberg: We are a central, campus-wide hub with a mission to help faculty move their research from the lab to the marketplace quickly, for the patient, and ultimately for the benefit of UCLA and society at large. We don't drive the research; we facilitate its translation into products or services that people need. That way, our faculty can pursue their creative ambitions; their innovations are valued and monetized, generating more income for university's research budget; and supporting scholarships and fellowships so our graduates can find jobs. It's a robust ecosystem of knowledge.

TDG consists of three functional pillars. The first is business development, where our people work with faculty to identify innovations and develop external applications for their research, arrange contacts with interested parties and facilitate deals. The second is industry-sponsored research, where we support everything from material transfer agreements to long-term collaborative research activities. We also have a central function role, such as managing business and tech transfer operations, such as marketing and licensing inventions; prosecuting patents; distributing royalties



In Vivo

and other income to inventors and various UCLA departments and labs; educating the UCLA student body and community about tech transfer issues; and evaluating the commercial value of new technologies. Third is New Ventures, which involves managing the UCLA Innovation Fund, which seeks to fill the funding gap between basic research at UCLA and commercial development through modest grants that cover those interim steps like proof-ofconcept and clinical validation studies.

UCLA is highly diversified in the life sciences so our work ranges from physical sciences and engineering to medical devices and diagnostics, drug therapeutics, and advanced software like artificial intelligence. We spend much of our time bringing to the table external partners with background to secure, value and monetize inventions developed across the UCLA campus. One of our more exciting recent examples of the UCLA Innovation Fund is the licensing of an AI algorithm for spine MRI evaluations to a local, faculty founded start-up, Theseus AI Inc.

In Vivo: *Do you have any recent examples of innovative collaborations that merit the attention of the* In Vivo *readership?*

Naiberg: In June, we launched a strategic collaboration with Autobahn Labs, a newly formed virtual life sciences investment incubator backed by the VC firm Samsara BioCapital; Evotec SE, a global drug discovery and development alliance company, based in Germany; and KCK Ltd., a US family office investment fund. UCLA is the first university to work with Autobahn on its mission to identify, fund and de-risk early-stage, preclinical research projects in academia that have significant therapeutic potential for patients. TDG will help Autobahn pursue its model of building joint ventures with university start-ups, accelerating the discovery and development process with strategic guidance as well as access to Evotec's network of 3,000 scientists and clinical trial logistics experts.

We like it because it brings a structured, "baked-in" process to academic-industry collaborations, minimizing a lot of the transactional friction that can occur when business partners try to negotiate financing, licensing/IP rights and due diligence on their own. Despite the COVID-19 distractions, Autobahn has already had discussions with 80 UCLA faculty members to share project ideas and I expect this to result in several brokered agreements on new start-ups by the beginning of 2021. I think the relationship with Autobahn is an important precedent that puts UCLA in the lead in bridging the translational science gap you just mentioned.

Another example where we innovate is our growing focus on the convergence between the tech sector and the life sciences. In June, UCLA signed a three-year

research partnership with Apple Inc. as part of the university's inter-disciplinary Depression Grand Challenge project geared to finding objective, evidence-driven metrics for diagnosis and treatment of this disease. It is notable that major depression, which afflicts an estimated 300 million people worldwide, still relies on the old tool of personal observation to track symptoms. Under the agreement with Apple, which TDG helped execute, the company will supply more than 3,000 study participants with smart watches and the Beddit sleep monitor to record individual behaviors in real time. With Apple's help, we are able to do all this research remotely, which represents a practice model that has resonance during a pandemic. I see the Apple agreement as a milestone for TDG as it enables us to diversify around key industries of the future outside of medicine.

Ken Schultz, chair and CEO Trethera Corp.: *The largest translational licensing life sciences deal to date was signed in November 2019 between Takeda Pharmaceuticals and the MD Anderson academic medical center. It involves the development of drugs from Anderson's novel platform of chimeric antigen receptor-directed natural killer-cell (CARNK) therapies, to treat B-cell lymphoma malignancies and other cancers. The project will launch in early 2021 with a Phase-1 cancer trial whose enrollment will also break records. Is TDG considering similar tech transfers with biopharma partners of this scale and scope? Is there an appetite on campus for this kind of precedent?*

Naiberg: Leadership in tech transfer relations with industry as well as other health providers is definitely something we aspire to. UCLA has the foundational capabilities to bring an asset forward, from high throughput screening at the discovery stage, clean rooms for manufacturing, right up to the clinical trial phase. However, whether we have the resources to manage those last crucial steps to the clinic is an open question. It certainly raises some issues relating to our priorities as a public university.

That's why right now we are putting the emphasis on partnering. I can point to a recent precedent where UCLA professor of medicine Dennis Slamon initiated the clinical trials that led to approval of Genentech's Herceptin (trastuzumab), one of the first targeted monoclonal drugs for cancer. He also collaborates with Brian Stoltz's chemistry lab at the California Institute Technology (Caltech) on a novel molecular construction for the treatment of cancer. Together with Caltech and some local investors, we spun a company from their joint work that continues to generate new compounds which can be evaluated quickly and efficiently for therapeutic potential and then moved to a clinical trial network affiliated with UCLA. I believe that to this day it is one the best models of how translational research delivers clinical results to many thousands of cancer patients. Although the present crisis around COVID-19 is certainly a setback, the example of this long-standing collaboration gives us a useful set of tools that we can replicate once campus life resumes.

In Vivo: *Many VC investors assert that it has become more difficult to assess opportunities among the growing number of start-ups launched from major academic research centers like UCLA. Do you agree and, if so, what is TDG doing to help raise the curtain on deal-making?*

Naiberg: We definitely see more academic start-ups operating in "stealth" mode. Arranging private capital is a competitive sport. It's understandable that a new startup will seek to control what it shares with prospective investors. What TDG has done is build a data base that serves as an up to date resource on all the spin-offs from UCLA's faculty and lab ecosystem, which a VC or biopharma company can access to find a match. All this is conducted in an open and transparent manner, freely available to all interested parties. We also strive to relate to the motivations of our different stakeholders: entrepreneurs want us to help them relate to the "next big thing," while VC firms are looking for projects that complement their own capital allocations and investments. And then there are our industry partners, most of whom want relationships that expose them to the diversity and range of our research interests. Most important, TDG has staff with the therapeutic area expertise to facilitate and progress these contacts. As the middleman, we strive to ensure everything works seamlessly and without friction.

Finally, TDG relies on UCLA's large alumni network as a rich source for new business development opportunities. Here in Los Angeles, there is a large group of affluent alumni outside biotech in areas like finance and entertainment who are personally familiar with UCLA's world-class medical institutions and may have benefited from that care. These business "angels" are proving useful in filling some of the gaps in start-up financing, especially for that initial seed round.

Looney, William "Academia Meets the Market - Part One". Originally published in *In Vivo*, 2021

Continue to Read "Academia Meets The Market - Part Two" here **IM**

David Baltimore *Caltech*

Appia Bio focuses on cancer fighting cell therapies based on UCLA research

APPIA BIO, INC. is an early stage biotechnology company based in Los Angeles developing engineered cell therapies for cancer patients.

Appia Bio is focused on discovering and developing off-the-shelf allogeneic cell therapies across a broad array of cancer indications, utilizing a scalable technology platform with the goal to increase access for patients. The ACUA platform, as it is named, originated from groundbreaking research in the laboratory of Lili Yang, PhD, associate professor at UCLA, and her collaborations with the company's other scientific founders. Yang's Lab helped create the process that produces genetically engineered iNKT cells (invariant natural killer T cells) that target cancer.

UCLA TDG provided the licenses to the technology and was involved in the venture creation process.

"Appia Bio is representative of another significant start up to spin out of UCLA and then remain in the L.A bioscience ecosystem. Their experienced management and significant funding lays the groundwork for Appia to be successful in their mission to battle cancer," said Mark Wisniewski, senior director, biopharmaceuticals, UCLA TDG.

The company recently launched from stealth backed by $52 million Series A financing led by 8VC. Other investors included Two Sigma Ventures, among others, and participation from seed investors Sherpa Healthcare Partners and Freeflow Ventures.

Proceeds from the financing will support the advancement of Appia Bio's pipeline of allogeneic CAR-iNKT cell therapy candidates into the clinic. As part of the Series A financing, Francisco Gimenez, PhD, partner, and David Moskowitz, PhD, principal, at 8VC, join the Company's board of directors, and Nobel Laurete David Baltimore, PhD, of the California Institute of Technology (Caltech) was elected chairman of the Board.

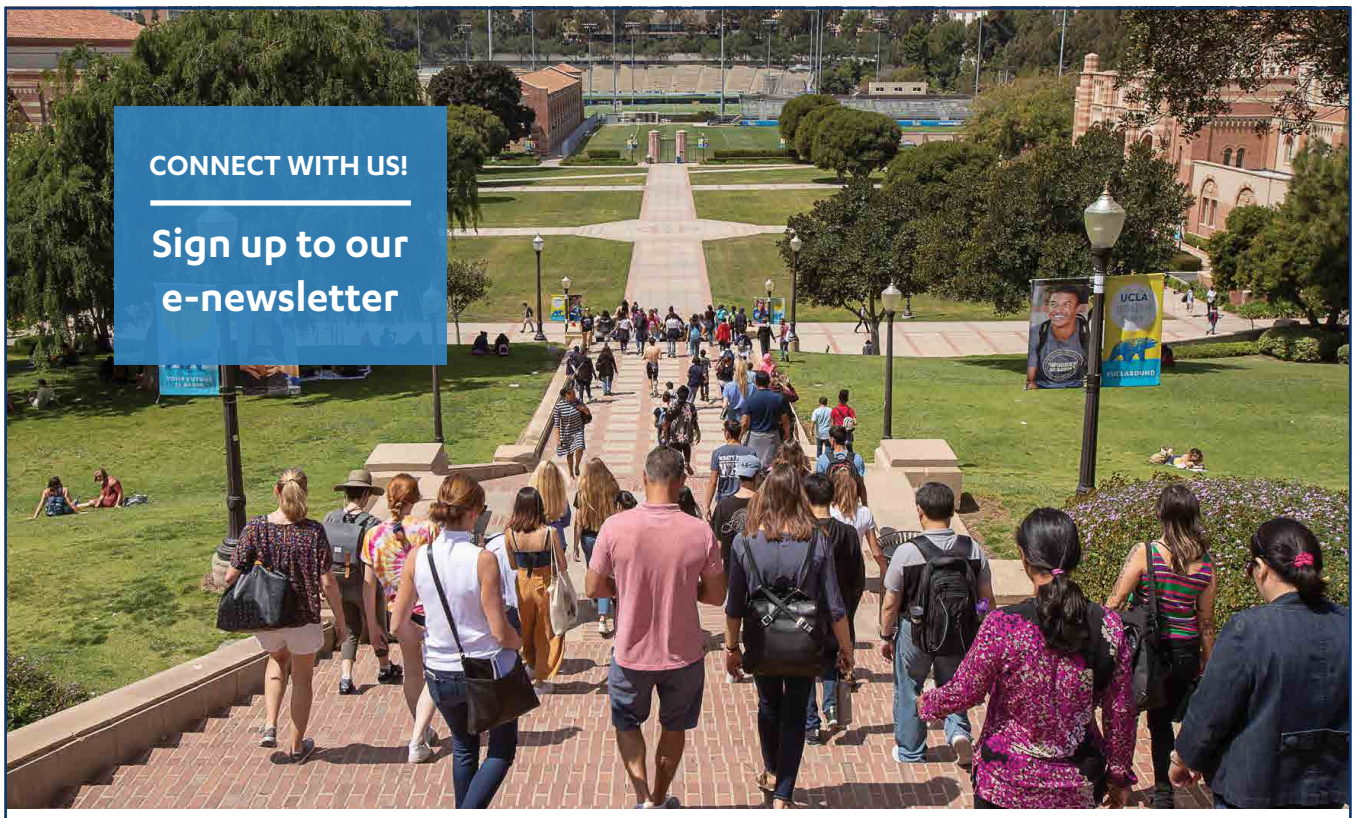
"There is tremendous potential to be explored in allogeneic cell therapies. The Board and I look forward to working with this stellar team to create transformative cell therapies that will help patients and the physicians who treat them," said Baltimore. **IM**

appiabio.com

Alliance for SoCal Innovation

SoCal Venture Pipeline brought to you by Silicon Valley Bank

Matching Series-A ready SoCal startups with venture capital investors



UCLA

Follow us on social media

UCLA TECHNOLOGY DEVELOPMENT GROUP

Gaurav Sant

UCLA Samueli School of Engineering

Team led by UCLA professor wins $7.5 million NRG COSIA **Carbon XPRIZE**

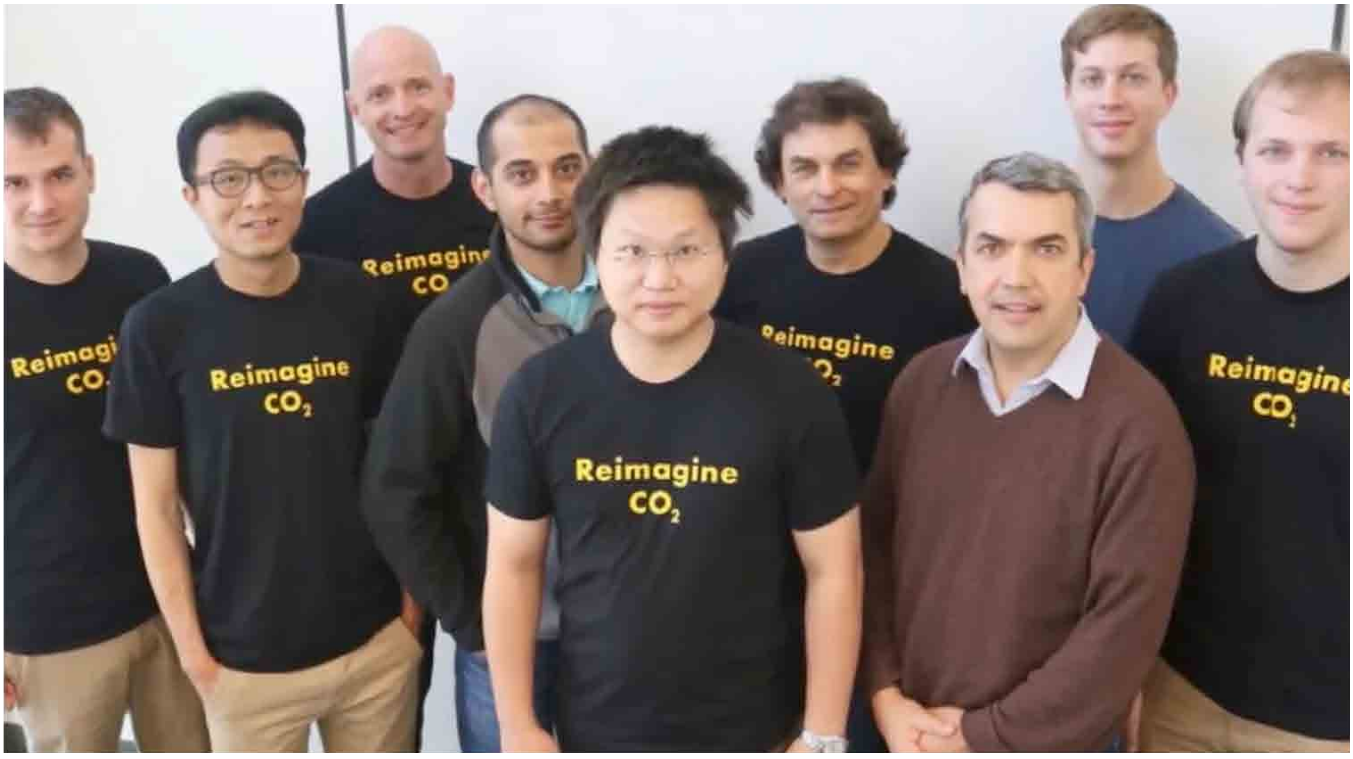
Researchers developed technology for turning carbon dioxide into concrete

By Christine Wei-li Lee

IN APRIL, THE UCLA CARBONBUILT TEAM, led by civil and environmental engineering Professor Gaurav Sant at the UCLA Samueli School of Engineering, won the $7.5 million grand prize in the NRG COSIA Carbon XPRIZE. The win marks the first time a university team has won an XPRIZE of any kind. See article below.

The multidisciplinary research team that developed the project, then named CO2Concrete, also participated in the 2020 cohort of UCLA's Faculty Innovation Fellows (FIF) program.

UCLA's FIF program is a campus-wide program aimed at advancing entrepreneurial excellence and startup culture among faculty. FIF is a collaboration between Startup UCLA, UCLA Technology Development Group and the Office of the Vice Chancellor of Research and Creative Activities. The program is designed to advance innovative faculty projects into new startups, centers, or non-profits through a series of workshops and 1:1 venture consulting meetings. [Editorial Note: Read more about the FIF Program and the new 2021 cohort on page 31.]



Team Carbonbuilt

UCLA Samueli School of Engineering

A group of UCLA engineers has become the first university team to win the grand prize in the NRG COSIA Carbon XPRIZE global competition. By mitigating the carbon footprint of concrete, the team's invention could eventually be a major step in the global battle against climate change.

The UCLA CarbonBuilt team, led by Gaurav Sant, a professor of civil and environmental engineering at the UCLA Samueli School of Engineering, won $7.5 million in the competition's track for technologies related to coal-fired power generation.

The winning technology is a first-of-its-kind, eco-friendly approach for taking carbon dioxide emissions directly from power plants and other industrial facilities — emissions that would otherwise go into the atmosphere — and infusing them into a new type of concrete invented by the team. As it hardens and gains strength, the specially formulated concrete permanently absorbs and traps the greenhouse gas.

Through extensive research at UCLA and testing at the Integrated Test Center, a facility outside of Gillette, Wyoming, the researchers demonstrated that their process reduced the carbon footprint of concrete by more than 50% while producing concrete that was just as strong and durable as the traditional material.

Each CarbonBuilt concrete block stores about three-quarters of a pound of carbon dioxide — a significant amount considering an estimated 1 trillion concrete blocks will be produced annually by the year 2027.

Sant joined the UCLA faculty in 2010. He and a group of staff scientists, postdoctoral scholars and doctoral students began the research that led to the award in 2014.

"I am absolutely thrilled that CarbonBuilt has won the NRG COSIA Carbon XPRIZE," said Sant, who directs the UCLA Institute for Carbon Management and holds a faculty appointment in the UCLA Engineering materials science and engineering department. "As a third-generation civil engineer, I have been fascinated with the role that construction has played in solving societal challenges. To have spent the past decade developing a solution to mitigate the carbon footprint of concrete with a phenomenal team, and to have won the NRG COSIA Carbon XPRIZE doing something I'm passionate about is an ultimate dream come true."

Sponsored by NRG Energy and Canada's Oil Sands Innovation Alliance, the $20 million NRG COSIA Carbon XPRIZE competition was launched in September 2015 to find ways to beneficially use carbon dioxide emissions. The nonprofit XPRIZE Foundation challenged a global community of problem-solvers to develop technologies for turning carbon dioxide from coal and natural gas power plant emissions into valuable products. A Canadian team called CarbonCure won the competition's other track, for natural gas–based power generation.

CarbonBuilt concrete blocks coming off of the production line.

UCLA Newsroom

UCLA's entry was one of 47 submissions from 38 teams in seven countries. CarbonBuilt, formerly known as CO2Concrete, was named one of the 10 finalists in October 2017.

Sant said the original inspiration for the winning technology came from an unlikely source: seashells.

"Seashells are made of calcium carbonate, which is nature's original cementation agent," he said. "We were really motivated by the idea of how seashells were held together. And that's how we really set about to turn carbon dioxide into concrete."

Challenged by experts in academia and industry who said it couldn't be done, Sant and his team spent the next seven years on a mission to prove them wrong.

First, the UCLA researchers developed a new formula for cement, which is the binding agent in concrete. They used hydrated lime, or portlandite, which can absorb carbon dioxide quickly, to replace traditional calcium silicate cement, known as ordinary portland cement. Then, the team created a method in which carbon dioxide taken directly from flue gas is quickly absorbed by portlandite as the concrete hardens.

In addition to absorbing carbon dioxide into the concrete, CarbonBuilt's Reversa process reduces the amount of ordinary portland cement needed to produce concrete by between 60% and 90%. The process

Gaurav Sant, a professor of civil and environmental engineering at the UCLA Samueli School of Engineering, holding samples of the concrete produced using the technology his team devised.

UCLA Samueli School of Engineering

also occurs at ordinary temperatures and pressures. As a result, CarbonBuilt concrete has a much smaller carbon footprint than conventional concrete. That could go a long way toward reducing the world's greenhouse gas output, since the production of traditional cement used in concrete is the cause of nearly 9% of the world's carbon dioxide emissions.

Another compelling advantage of the new technology is that it is cost-effective. Unlike other carbon-mitigation technologies that require an expensive setup to capture the carbon dioxide emissions or purify them, the CarbonBuilt process allows for carbon dioxide in power and industrial plants' flue gas to be utilized directly and converted at its source without those extra steps.

"It's a transformative, eureka moment for UCLA and for science and engineering," said Jayathi Murthy, the Ronald and Valerie Sugar Dean of UCLA Engineering. "Through sheer tenacity and determination, Gaurav and his team were able to turn a research project into an innovative technology that can solve a real societal problem and drive positive change in the world."

To advance to the finals, the UCLA researchers demonstrated that their technology could consume 135 kilograms (about 297 pounds) of carbon dioxide in 24 hours.

> **"To have spent the past decade developing a solution to mitigate the carbon footprint of concrete with a phenomenal team, and to have won the NRG COSIA Carbon XPRIZE doing something I'm passionate about is an ultimate dream come true."**
>
> ***– Gaurav Sant***

In 2017, the team had to meet certain technical requirements, subject to verification by an independent firm. Those results were then evaluated by a panel of expert judges from academia and industry who assessed the amount of carbon dioxide that was converted into CarbonBuilt concrete, as well as the engineering, environmental and economic value of the construction material.

Originally scheduled for February 2020, the competition's final round was postponed due to the COVID-19 pandemic. In June 2020, the UCLA team deployed to the Integrated Test Center to demonstrate its system on an industrial scale. The demonstration ran for four months and produced nearly 150 metric tons (more than 330,000 pounds) of CarbonBuilt concrete blocks. Some of the concrete blocks were donated to the Eastern Shoshone tribe for housing projects on the Wind River Reservation in Fort Washakie, Wyoming.

The funds from the NRG COSIA Carbon XPRIZE award will support innovative carbon-mitigation research and technology development at UCLA Engineering. CarbonBuilt, which is a private company founded by Sant, has secured rights related to the project's patent portfolio owned by UCLA to commercialize the technology.

Prior to winning the grand prize, the team has raised $10 million toward the development of the CarbonBuilt technology. In addition to a $500,000 award from the XPRIZE Foundation in 2018 for reaching the finals, Sant secured a $1.8 million grant in 2019 from the Department of Energy. (Additional testing to complete the DOE grant recently concluded at the National Carbon Capture Center in Wilsonville, Alabama.) And the Anthony and Jeanne Pritzker Family Foundation contributed $1.5 million in 2017.

Many UCLA faculty members have contributed to the team's success, including Dante Simonetti, an assistant professor of chemical and biomolecular engineering; J.R. DeShazo, a professor of public policy, and of civil and environmental engineering, and director of the UCLA Luskin Center for Innovation; Laurent Pilon, professor of mechanical and aerospace engineering and of bioengineering; Richard Kaner, a distinguished professor of chemistry and biochemistry and of materials science and engineering; and Mathieu Bauchy, an associate professor of civil and environmental engineering.

Additional team members include current and former UCLA Engineering project scientists Dale Prentice, Gabriel Falzone, Iman Mehdipour and Bu Wang; Hyukmin Kweon, a former UCLA postdoctoral scholar; Zhenhua Wei, a former doctoral student in civil and environmental engineering; Camly Tran, executive director of the Institute for Carbon Management; and seasoned industry advisers including Edward Muller, Stephen Raab and CarbonBuilt CEO Rahul Shendure. **IM**

This article originally was published on *UCLA Newsroom*

Geoffrey Tate

Flex Logix

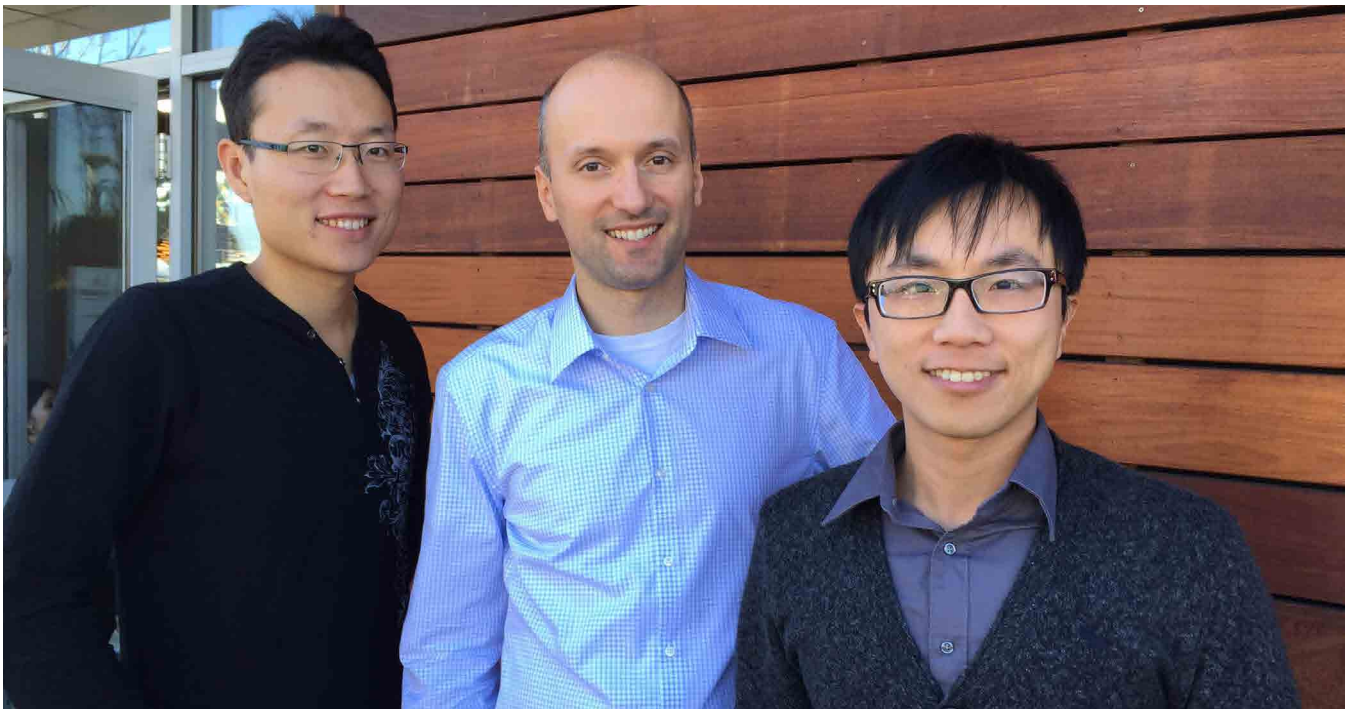
Flex Logix continues to connect computing at the edge

FLEX LOGIX TECHNOLOGY includes embedded Field Programmable Gate Arrays (eFPGA) - a data flow architecture integrated into the system-on-chip (SoC) structure that is programmable after manufacturing. The company's EFLX design allows microprocessors to handle more complex tasks — for example, algorithm-intensive software applications such as digital signal processing, datacenter acceleration and high-speed networking — with greater flexibility while using less energy than other FPGA designs. Along with its unique processor and connectivity, Flex Logix ELFX proves to be a fast and efficient product that can easily scale.

Flex Logix recently launched a new microprocessor product group called InferX, targeted for edge inference applications in artificial intelligence (AI) and machine learning.

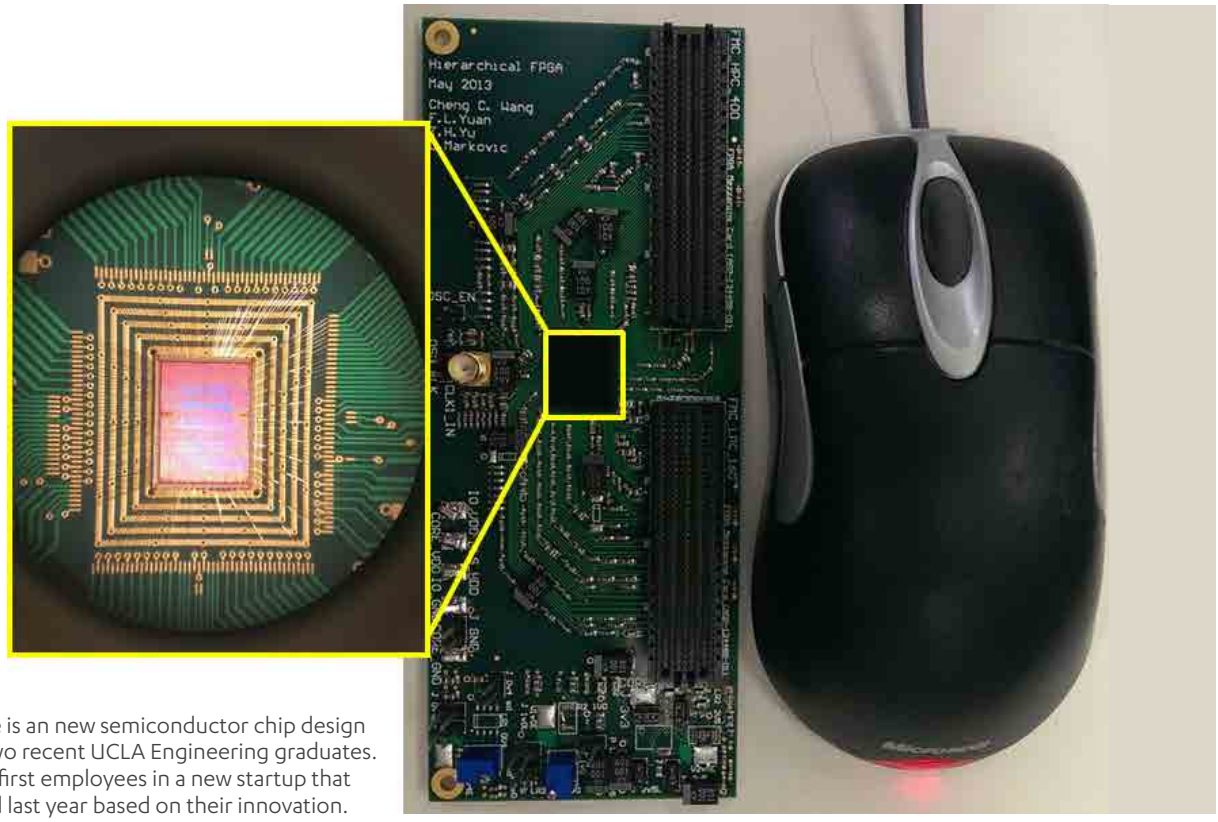
In March 2021, the 7 year old company, led by CEO Geoffrey Tate, raised $55M Series D financing which supports Flex Logix's next business growth phase building out software, engineering and customer support teams as well as the start of mass production of its products.

"The funding allows us to continue to grow the eFPGA business which is now profitable. We have many govern-



UCLA Newsroom

Cheng C. Wang, Dejan Markovic and Fang-Li Yuan. Wang and Yuan earned their Ph.D.s in electrical engineering. Professor Markovic was their advisor.



Shown above is an new semiconductor chip design created by two recent UCLA Engineering graduates. They are the first employees in a new startup that was launched last year based on their innovation.

UCLA Newsroom

ment clients and continue to expand into other markets including major 5G companies and data systems," said Tate. "And we are just at the start of the growth stage of the AI inference business. We provide AI to applications like gene sequencing, medical imaging and big autonomous robots that perform factory inspections. Basically we'll apply this tech to enterprise applications that require high performance and high accuracy."

Over the past year, Flex Logix has doubled the size of the company, acquiring additional space for its Mountain View, CA headquarters and a new office in Austin, TX. But the origins of the company started at UCLA.

Then both UCLA PhD candidates, Cheng Wang and Fang-Li Yuan worked with Professor Dejan Markovic in the Electrical Engineering Department on advanced integrated circuit interconnect technology for FPGAs and software that would lead to the development of Flex Logix technology. Wang's intention was to go head to head with the major FPGA companies but Tate saw other opportunities in ELFX as an embedded SoC solution. It was the marriage of leading edge science and business foresight that has been the foundation of Flex Logix as a company.

UCLA Technology Development Group licensed this technology to Flex Logix and currently, Wang is svp engineering, co-founder & board member and Yuan is senior hardware design manager at the company.

The company continues to grow and look to the future of reconfigurable computing.

"We will have additional product offerings. On the surface our two products don't seem to be connected but they are," comments Tate. "The common core is what I call reconfigurable computing different than the traditional microprocessor approach. In certain applications reconfigurable computing it is more efficient than the traditional."

Tate concludes, "We've identified a third market of Advance Signal processing and eventhough we don't currently offer solutions for it, we know that our technology can provide much higher performance per dollar than FPGAs that a lot of people use for things like testers and radars. At some point in time, we'll provide a solution based on reconfigurable computing and there will likely be other applications that we will find. Our technology will provide superior solutions to existing approaches."

Read about the research of UCLA Alums Chen Weng and Fang-Li Yuan https://newsroom.ucla.edu/stories/two-engineering-alumni-redesign-devices-that-power-computers-cellphones **IM**

UCLA Broad Stem Cell Research Center

Six of the children who received treatment at UCLA through the gene therapy clinical trials.

Gene therapy offers potential cure to children born without an immune system

Study shows treatment developed by international team restored immune function in more than 95% of patients in three clinical trials

By Tiare Dunlap

An experimental form of gene therapy developed by a team of researchers from UCLA and Great Ormond Street Hospital in London has successfully treated 48 of 50 children born with a rare and deadly inherited disorder that leaves them without an immune system.

Severe combined immunodeficiency due to adenosine deaminase deficiency, or ADA-SCID, is caused by mutations in the ADA gene that creates the enzyme adenosine deaminase, which is essential to a functioning immune system. For children with the condition, even day-to-day activities like going to school or playing with friends can lead to dangerous, life-threatening infections. If untreated, ADA-SCID can be fatal within the first two years of life.

The investigational gene therapy method involves first collecting some of the child's blood-forming stem cells, which have the potential to create all types of blood and immune cells. Next, using an approach developed by the research team, a new copy of the ADA gene is delivered into the stem cells by a modified lentivirus, or "viral vector." The corrected cells are then returned to the child's body, where they are intended to produce a continual supply of healthy immune cells capable of fighting infection.

In a study published today in the New England Journal of Medicine, co-lead authors Dr. Donald Kohn of UCLA and Dr. Claire Booth of Great Ormond Street Hospital, or GOSH, report two- and three-year outcomes for children treated with the investigational lentiviral gene therapy in clinical trials at GOSH, UCLA Mattel Children's Hospital and the National Institutes of Health between 2012 and 2017.

"Between all three clinical trials, 50 patients were treated, and the overall results were very encouraging," said Kohn, a distinguished professor of microbiology, immunology and molecular genetics and a member of the Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research at UCLA. "All the patients are alive and well, and in more than 95% of them, the therapy appears to have corrected their underlying immune system problems."

No complications or treatment-limiting events were reported among the patients. Most adverse events were mild or moderate, and were considered to be related to routine procedures performed in preparation for the experimental gene therapy treatment or effects of the immune system rebuilding.

"Treatment was successful in all but two of the 50 cases, and both of those children were able to return to current standard-of care-therapies and treatments, with one eventually receiving a bone marrow transplant," said Kohn, who has been working to develop gene therapies for ADA-SCID and other blood diseases for 35 years.

The investigational gene therapy — a one-time procedure that the researchers say may provide lifelong results — is a welcome potential new treatment option for children with ADA-SCID, who otherwise must undergo once- or twice-weekly injections of the ADA enzyme until a matched bone marrow donor, usually a close family member, can be found. If a donor is not available, patients require lifelong injections, along with antibiotics, antifungal medications and monthly infusions of immunoglobulin, which contains infection-fighting antibodies. These treatments are expensive and therefore out of reach for patients in many countries.

"If approved in the future, this treatment could be standard for ADA-SCID, and potentially many other genetic conditions, removing the need to find a matched donor for a bone marrow transplant and the toxic side effects often associated with that treatment," said Booth, a GOSH consultant in pediatric immunology and gene therapy.

The benefits of lentiviral gene therapy

Prior to teaming up, both Booth and Kohn worked separately for years on successful gene therapies for ADA-SCID that used viral vectors made from retroviruses. Retroviral vectors, however, can only enter cells' nuclei to deliver genes while the cells are dividing, limiting the number of cells receiving the genetic payload and, thereby, the potential efficacy of the treatment.

Additionally, while neither Kohn nor Booth observed serious complications in their ADA-SCID trials, other earlier studies testing retroviral vector-based gene therapies did report some serious side effects, including leukemia, in some patients.

In 2008, Booth and Kohn began collaborating with professors Bobby Gaspar and Adrian Thrasher of University College London to develop an improved viral vector using a different kind of virus, called a lentivirus. Viruses of this kind can enter non-dividing cells' nuclei and, when used as vectors, have the potential to make gene therapies safer and more effective. ADA-SCID patients began receiving the new gene therapy at GOSH in 2012; the following year, the experimental treatment was offered at UCLA and the NIH.

"More than 200 patients with various genetic conditions across the world have now been treated with experimental lentiviral gene therapies, and applying gene therapy to ADA-SCID is another significant scientific advance," said Thrasher, a senior author of the study who is also a professor of pediatric immunology at GOSH.

Ten of the children in the UCLA study were treated using a frozen preparation of corrected stem cells. These children experienced similar outcomes to the children treated with cells that were not frozen. The freezing approach may allow children with ADA-SCID to have their stem cells collected locally, then have them transported and processed at a manufacturing facility elsewhere and shipped back to a specialized hospital near them, removing the need for patients and their families to travel long distances to specialist centers.

The investigational lentiviral gene therapy is not approved for clinical use by any regulatory authority and can only be administered as part of a registered clinical trial. It is hoped that the positive results from this trial can lead the therapy to become a first line treatment for this devastating disease.

UCLA is actively seeking commercial partners, please contact Ragan Robertson at ragan.robertson@tdg.ucla.edu for more information.

This article originally appeared on UCLA Newsroom. **IM**

One patient's story:
A life-changing treatment

Courtesy of Chelsea Oakley

ONE OF THE PATIENTS who received a frozen preparation of cells at UCLA, Cora Oakley of Morristown, New Jersey, was diagnosed with ADA-SCID through newborn genetic screening at just 7 days old, in April 2017. "I remember asking the doctor if my daughter was going to die," Cora's mother, Chelsea Oakley, said of receiving the diagnosis. "And his response was, 'I hope not.' It was the darkest day of my life."

Cora was the last child to enroll in the clinical trial and received her own corrected cells in September 2017. Following the gene therapy, Cora and her family spent a month in the bone marrow transplant unit of a hospital closer to their home for Cora's follow-up treatment. The experiences of the other young patients in this unit opened Oakley's eyes to what her daughter would have gone through if the experimental gene therapy hadn't been an option.

"I saw young bone marrow transplant patients who developed graft-versus-host disease and others who had to take all these anti-rejection medications and still had issues. I just thought no one should have to suffer like this," she said. "And then here's my daughter who had this life-changing treatment that felt like a miracle. It still shocks me all the time how unbelievably fortunate we are."

Now a healthy and exuberant 4-year-old, Cora is described by her mom as a "rough and tumble, outdoors kind of kid" who loves all animals and is incredibly social. "I'll never forget what it felt like when we didn't know if she'd ever be able to do any of these things," Oakley said.

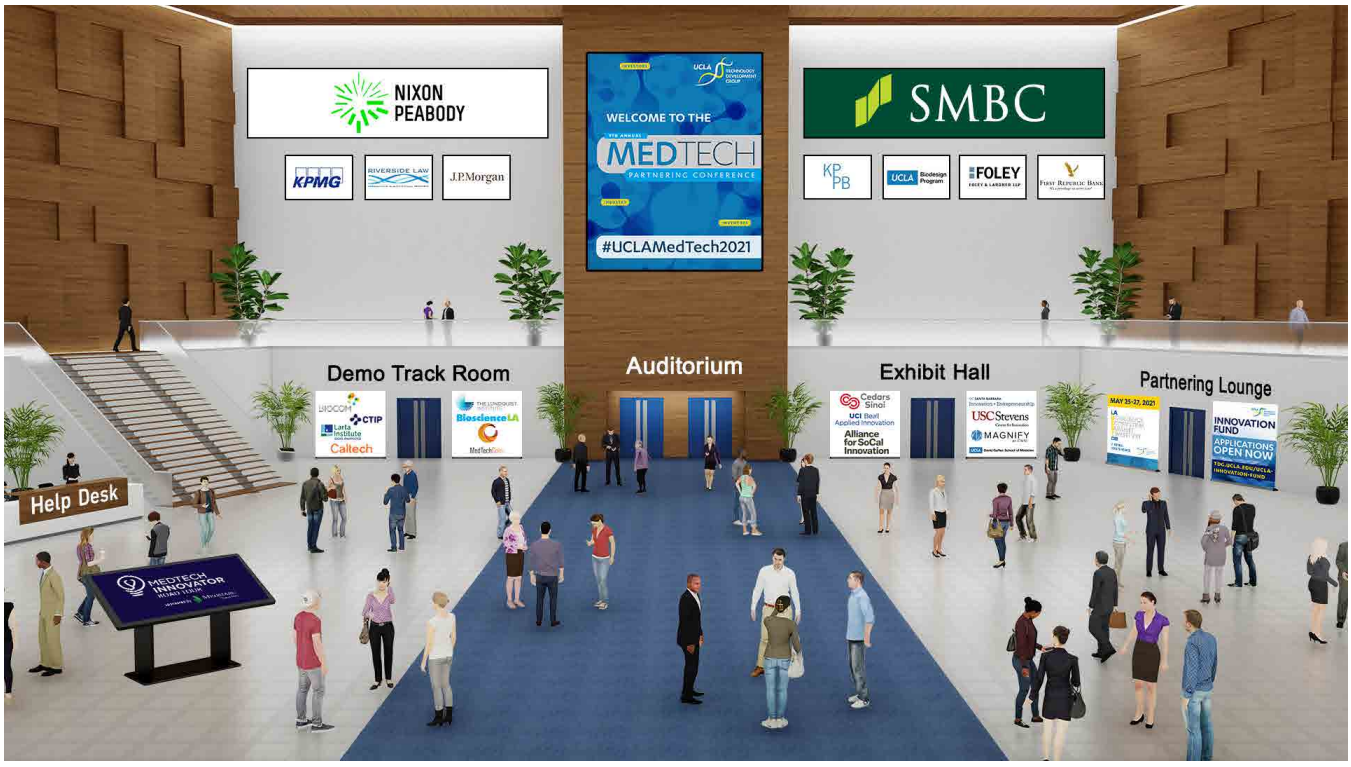
2021 UCLA TDG **MedTech** Partnering Conference

By Dina Lozofsky

THIS WAS AN INTERESTING YEAR, as in the curse, "may you live in interesting times" (I looked it up, it's actually not a Chinese curse, according to Wikipedia, that's a myth!). On the other hand, this year has probably made us more resilient and helped us find new and interesting ways to accomplish our business – business that many of us have been doing for a very long time. Oddly enough, the 2020 UCLA TDG MedTech Partnering Conference was the last in person event a lot of us attended before the pandemic and I was SO HOPING 2021's event would be the first in person one. My hopes were not realized, but instead, we learned how to successfully run a conference virtually – with lots of different content and ways to engage for our partners, participants and sponsors. Major kudos to our amazing event team!

I think the event and our speakers highlighted several lessons learned from or accentuated by the pandemic times:

- Companies that quickly pivoted/adjusted/were nimble in spending and business models found a way to survive or even thrive, especially in the start-up world. Kevin Zhang from Upfront Ventures on our Investor Panel focused on industry trends was quick to point this out.



MedTech2021 virtual lobby

UCLA TDG

"Beyond Philanthropy: business models for successfully serving the underserved"
Matthew Savary, Josh Vose, Dorothee Goldman, Kathryne Cooper

UCLA TDG

- Don't get stuck in conventional wisdom or the way things have always been done – this is always true, but the pandemic brought this home. A perfect example is new reliance on delivery/transportation models. In particular, our panel on business models for serving the underserved highlighted how you can rely on delivery services instead of your own sales team/logistics on the ground when serving underserved geographical locations. This makes many locations much more economically feasible for supporting and building a business.
- Remember the good old telephone! Our telehealth panel emphasized that any strategy for continued use must include simple telephone visits to ensure equity and inclusion in patient access.
- Even though we all want to return to "normal" and meet face to face at events for the best engagement, there are definitely opportunities to continue leveraging virtual attendance at our conferences for attendees who are not able to join us in person. I expect we will hold a hybrid event in 2022 and perhaps years to come to make the most of our event for all of you!

LA MedTechWeek
POWERED BY BiosciencesLA

2021 also marked the very first time the LA ecosystem joined together for LAMedTechWeek! Organized by Bioscience LA and many local partners, we set the stage for telling the world about all the wonderful medtech innovations being generated and implemented in southern California to improve patient care and outcomes.

It was indeed an interesting year! We're starting planning for next year's UCLA Medtech Partnering conference, save the date March 8th, 2022. And, we will be partnering again to bring you the second annual LA MedTech Week, starting March 7, 2022! If you are interested in partnering, sponsoring or participating, please contact me at dina.lozofsky@tdg.ucla.edu. **IM**

"Tracking and treating Depression with Digital Health Tools from UCLA's Depression Grand Challenge"
Joel Kehle, Michelle Craske, Jonathan Flint

UCLA TDG

LA BIOSCIENCE ECOSYSTEM SUMMIT TWENTY21™
UCLA

UCLA LABEST 2021 Virtual Conference

LABEST IS THE PREMIER SHOWCASE FOR BIOSCIENCE INNOVATION in Los Angeles County with attendance by key stakeholders in the Los Angeles area, including: Caltech, Cedars-Sinai, City of Hope, The Lundquist Institute, UCLA and USC. The event's mission is to promote Los Angeles as a center of excellence for biotech innovation and to foster partnerships between academic institutions, the investment community and the biopharma industry. Leading bioscience translational research programs, faculty entrepreneurs and start-ups are showcased where Southern California Institutions have significant expertise, pioneering research and resource commitments directed towards developing innovative therapeutics.

LABEST 2021 was the third event that TDG organized over four years and was entirely virtual over the three days of May 25 – 27, 2021. It had the highest registration yet of 1,140, which included over 350 from UCLA, close to 400 from the biopharma industry and over 200 participants from Los Angeles regional partners USC, Caltech, Cedars-Sinai and City of Hope. A new component was a start-up track featuring 3 minute pitches from over 25 companies.

VIEW LABEST ONLINE

All of the 21 LABEST sessions including keynotes, opening remarks and panels were recorded and are available for viewing on the UCLA TDG YouTube Channel. All of the UCLA and Partner Institution Professor Spotlights can be viewed on the UCLA TDG website.

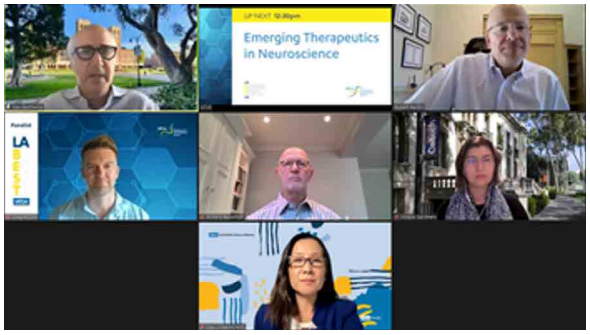
"Hospital CEO's Sharing Innovations" with Judy Fortin, Johnese Spisso, Jeff Smith, Rod Hanners, Elaine Batchlor

LABEST 2021 virtual lobby

All images UCLA TDG

"E.L.I.T.E" Keynote with Martin Jarmond

"Why LA" Keynote with Eric Esrailian, Gene Sykes and Jaime Lee



"Emerging Therapeutics in Neuroscience" with Dan Geschwind, Robert Pacifici, Greg Rippon, Richard Ransohoff, Viviana Gradinaru and Linda Liau

SAVE THE DATE

LABEST 2022 is scheduled for Thursday May 26, 2022 with Pre-Event activities and reception planned for Wednesday May 25, 2022.

SOME EVENT HIGHLIGHTS include:

- A "Why LA" keynote focused on Los Angeles' attraction as a bioscience ecosystem and bright future hosting the 2028 Summer Olympics with Dr. Eric Esrailian, Chief, Vatche & Tamar Manoukian Division of Digestive Diseases at UCLA, Jaime Lee, CEO, Jamison Realty and Gene Sykes, LA 2028 CEO
- An E.L.I.T.E keynote by Martin Jarmond, The Alice and Nahum Lainer Family Director of Athletics, UCLA who conveyed the critical importance of teamwork and role responsibility for every member regardless if it pertains to sports achievement or drug development
- A keynote by Anne Rimoin, Professor, Dept. of Epidemiology, UCLA Fielding School of Public Health on "COVID 19 and Beyond - Preventing The Next Pandemic Before It Starts"
- The "Hospital CEOs Sharing Innovations" panel moderated by Judy Fortin, Executive Director of Communications, UCLA Health & David Geffen School of Medicine, who guided the discussion of LA hospitals response to the COVID-19 pandemic with Johnese Spisso, CEO, UCLA Hospital System and representatives from MLK Community Healthcare, Keck Medicine of USC and Cedars Sinai Health System
- The Pearl Cohen Poster Plaza featured 83 posters with seven categories of award winners from UCLA, USC, Caltech, City of Hope and a UCLA undergraduate
- 32 pre-recorded Professor Spotlight presentations were featured from all the leading Los Angeles institutions

All images UCLA TDG

UCLA LABEST PEARL COHEN POSTER AWARD WINNERS

PRESENTED BY:
Mark Cohen, Senior Partner & Chair, Life Sciences Practice Group, Pearl Cohen Zedek Latzer Baratz

CANCER

1ST PLACE:
Ralf Buettner, Steve Rosen Lab, CoH
Targeting Acute myeloid Leukemia (AML) with THE NUCLEOSIDE ANALOG 8-CHLORO-ADENOSINE

2ND PLACE:
Yanruide Li, Lily Yang Lab UCLA
Allogenic iNKT Cells for Cancer Immunotherapy

CARDIO-METABOLISM

1ST PLACE:
Megan Rexius, Megan McCain Lab, USC
Targeting Acute myeloid Leukemia (AML) with THE NUCLEOSIDE ANALOG 8-CHLORO-ADENOSINE

2ND PLACE:
Sean Atamdede, Carla Koehler Lab, UCLA
Mediating Mitochondrial Dynamics

I3T

1ST PLACE:
Mahdi Hasani, Manish Butte Lab, UCLA
COVID-19 Vaccine Booster

2ND PLACE:
Huan Peng, Iris Chen Lab, UCLA
Abalation of Aeruginosa by Photothermal Therapy

NEUROSCIENCE

1ST PLACE:
Srbui Azarpetian Thomas Carmichael Lab, UCLA
hiPSC-Glial Enriched Progenitors Enhance Motor Recovery and Axonal Growth after White Matter Stroke

2ND PLACE:
Jennifer An, Jason Hinman Lab, UCLA
New Drugs for Stroke Recovery

PRECISION HEALTH

1ST PLACE:
Marwa Ben Haj Salah, John Rossi Lab, CoH
Redox-sensitive meta-stable junction for multivalent delivery of therapeutics

2ND PLACE:
Isaura Frost, Paul Weiss Lab, UCLA
SLIPS-Coated Rapid Deformation Device for Intracellular Delivery

RARE DISEASES

1ST PLACE:
Michael Emami, Melissa Spencer Lab, UCLA
Identifying New AAV Serotypes with Muscle Stem Cell Tropism

2ND PLACE:
Angel Ni, Rachelle Crossbie Lab, UCLA
Cell-matrix interactions in muscular dystrophy-associated cardiomyopathy

REGENERATIVE MEDICINE

1ST PLACE:
Xuexiang Zhang, Song Li Lab, UCLA
Dental Patch for Peridontitis

2ND PLACE:
Kathleen Cunningham, Leanne Jones Lab, UCLA
Neuroglian/L1CAM Regulate Drosophila Intestinal Stem Cell Proliferation

CONGRATULATIONS, WINNERS!

UCLA joins the **University Technology Licensing Program**

FIFTEEN OF THE COUNTRY'S LEADING RESEARCH UNIVERSITIES — Brown, Caltech, Columbia, Cornell, Harvard, the University of Illinois, Michigan, Northwestern, Penn, Princeton, SUNY Binghamton, UC Berkeley, UCLA, the University of Southern California, and Yale — recently launched University Technology Licensing Program LLC (UTLP).

UTLP was formed to provide a new and innovative way to conveniently disseminate and encourage further use of innovations developed in the physical sciences by contributing patents related to a specific field into a pool that can be licensed to industry in packages. The program will provide interested companies with a "one-stop shop" that licenses patents relevant to licensees' existing and/or future product offerings. Revenues derived from the licensing program will support the universities' ongoing research and innovation.

UTLP has identified multiple technology areas in which participating universities have patented inventions available for licensing. Each participating university will determine which patents from among its intellectual property portfolio to contribute to the UTLP pool. UTLP anticipates starting with licensing efforts in connectivity (e.g., power management, networking protocols, signal processing and codecs, location tracking, cameras and image processing), autonomous vehicles (e.g., millimeter-wave hardware, optical hardware, cybersecurity, sensors), and data applications (e.g., storage, data management, network protocols). In the future, UTLP expects to license university patents in semiconductor fabrication, applied electronics, batteries, photovoltaics, robotics, and other areas. **IM**

More information can be found at https://www.utlp.net/

utlp.net

The Science Coalition report

IN APRIL 2021, THE SCIENCE COALITION (TSC) released Sparking Economic Growth Report Volume IV

The report, which features 53 spin off companies founded based on federally funded research conducted at universities across the United States, includes 11 examples based on research from UC campuses (20% of the companies featured). Of those eleven, 2 are UCLA companies that generate thousands of American jobs.

Orchard Therapeutics is dedicated to transforming the lives of patients with rare diseases through innovative gene therapies. The company directly employs over 200 people and supports 3,858 jobs.

Cytovale pioneered reliable diagnostics for fast-moving diseases. Over a dozen people are directly employed and the company supports 125 jobs in the States.

Federally funded research plays an important part in the creation of start-up companies as well as the Bayh-Dole Act that allows for the commercialization of research. **IM**

SPARKING ECONOMIC GROWTH
Volume IV

THE SCIENCE COALITION

CALIFORNIA

TSC INSTITUTIONS' RESEARCH EXPENDITURES CONTRIBUTION: TO U.S. GDP: $1,990.6 M • TO EMPLOYMENT: 26,300

These California companies trace their roots to federally funded university research. Federal investment in research has resulted in short- and long-term economic benefits by contributing hundreds of thousands of American jobs each year, which in turn generate billions of dollars in wages and boost local and state economies.

COMPANIES

COMPANY	SECTOR	DIRECT EMPLOYMENT	GRANT RECEIPTS	INDIRECT/ INDUCED JOBS SUPPORTED	TOTAL JOBS
Orchard Therapeutics	Pharmaceutical preparation manufacturing	252	$936,480,000	3,858	4,110
Mammoth Biosciences, Inc.	Computer systems design services	36	$140,000,000	320	356
Cytovale	Scientific research and development services	15	$44,595,000	125	140
Tesio Pharmaceuticals, Inc.	Watch, clock, and other measuring and controlling device manufacturing	8	$260,000	22	30
ViQi	Computer systems design services	10	$2,156,000	19	29
South 8 Technologies	Storage battery manufacturing	5	$6,600,000	24	29
FarmSense	Scientific research and development services	6	$2,400,000	21	27
Cognivive, Inc.	Scientific research and development services	5	$1,450,000	16	21
Apsidal	Software publishers	4	$400,000	10	14
SensIT Ventures, Inc.	Scientific research and development services	3	$100,000	8	11
Deepbits Technology, Inc.	Support activities for agriculture and forestry	3	$2,000,000	5	8

FEDERAL RESEARCH AGENCY FUNDING
(In Millions)

- NIH: National Institutes of Health: $5,000
- U.S. Department of Energy: $229
- NSF: National Science Foundation: $1,170
- U.S. Department of Defense: $5,522
- USDA: U.S. Department of Agriculture: $109

UNIVERSITY OF CALIFORNIA

Agency Data: https://faseb.org/Science-Policy-and-Advocacy/Federal-Funding-Data/Federal-Funding-by-State-District and https://oldcc.gov/defense-spending-state-fiscal-year-2019

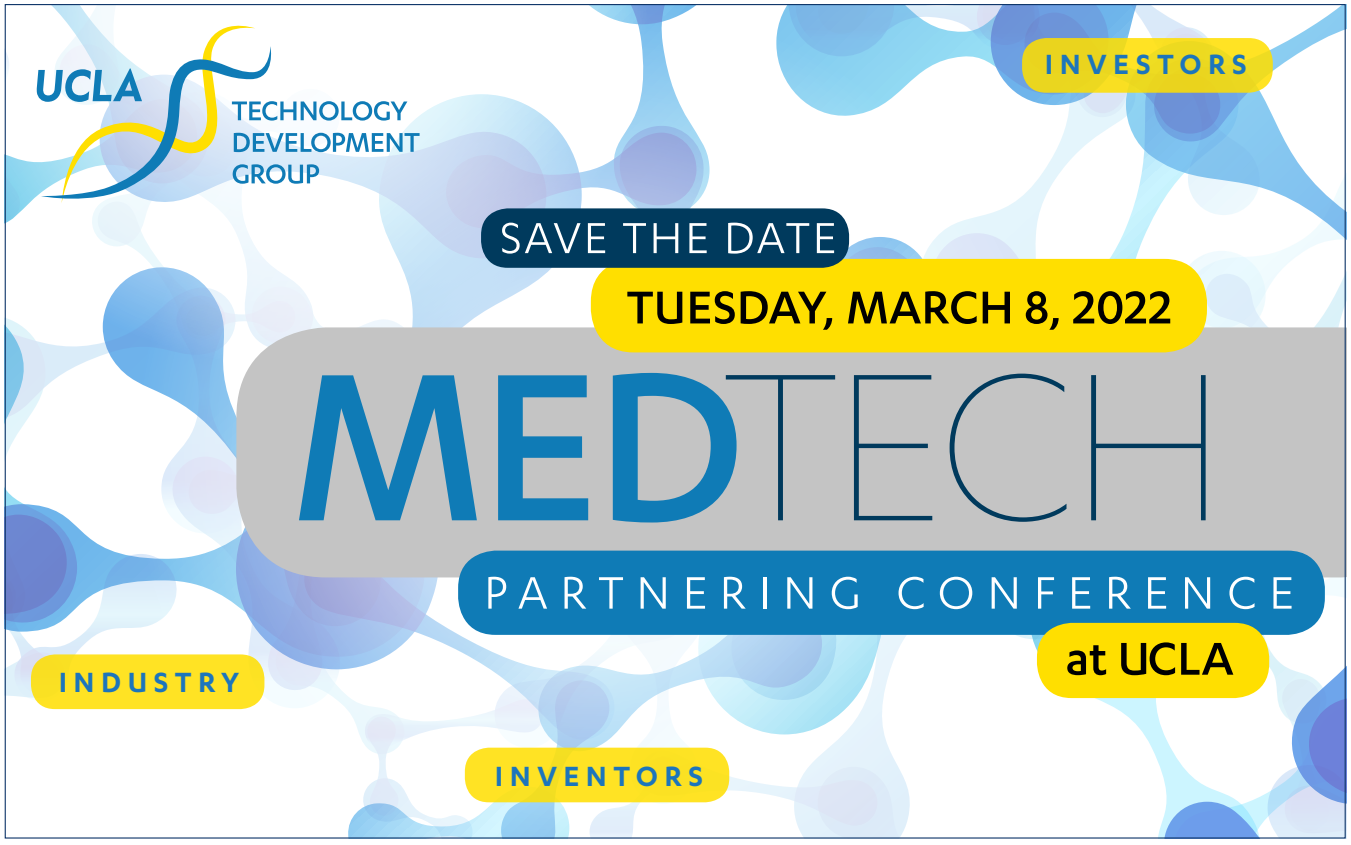
sciencecoalition.org

Andrei Iancu

Andrei Iancu has joined the TDC Board

ANDREI IANCU is a Partner at Irell & Manella LLP. He was the former Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office (USPTO). He was confirmed unanimously (94-0 floor vote) by the Senate in February 2018, and enjoyed strong bipartisan support throughout his tenure. In this role, Mr. Iancu provided leadership and oversight to one of the largest intellectual property offices in the world, with approximately 13,000 employees and an annual budget over $3.5 billion. He was also the principal advisor in the Administration on domestic and international intellectual property policy matters.

Mr. Iancu has been recognized as one of the country's top intellectual property lawyers. Prior to his service in government, Mr. Iancu represented clients in a wide variety of industries, appeared regularly in federal courts and at the USPTO, published and spoke often on intellectual property and law firm management issues, and taught patent law at the UCLA School of Law. **IM**



Faculty Innovation Fellows 2021 Cohort

NINE FACULTY WERE SELECTED to participate in UCLA's Faculty Innovation Fellows third cohort, a program designed to support and amplify faculty entrepreneurship at UCLA.

SIERRA BURKHART
Academic Director, UCLA Geospatial and Michael Shin, Professor, Geography; Geograf.io Districting

WARREN COMULADA
Associate Professor, Psychiatry and Biobehavioral Sciences; A virtual reality experience to reduce anxiety in children prior to surgery

LIANG GAO
Assistant Professor, Bioengineering; High-resolution, real-time flash imaging Lidar systems

MING GUO
Professor, Neurology; MitoRejuvenation

MAHDI HASANI
Project Scientist, Dentistry & Bioengineering; uTheraPatch

IAN HOLLOWAY
Assistant Professor, Social Welfare; Gay Sexuality and Social Policy Institute

MONA JARRAHI
Professor, Electrical and Computer Engineering; Lookin Inc.

JUSTIN KARLIN
Assistant Professor, Stein and Doheny Eye Institutes; A novel serum tears preparation device

ROY WOLLMAN
Professor, Chemistry & Biochemistry; BioCartography

The Faculty Innovation Fellows program is a collaboration between Startup UCLA, UCLA Technology Development Group, and, the Office of the Vice Chancellor of Research and Creative Activities. Through Startup UCLA, Fellows collaborate with program leaders, venture consultants, and colleagues across the university to hone and advance their ideas.

The mission of Startup UCLA is to promote the development of the entrepreneurial mindset on campus, to connect participants with the entrepreneurship community, to provide learning opportunities that include an inquiry-based and experiential approach to developing ideas, and to advocate for the entrepreneurial community at UCLA, partnering with students, faculty, staff, and alumni to achieve that end.

The mission of UCLA Technology Development Group is to promote UCLA innovation, research, teaching and entrepreneurship to benefit society; create economic value to support UCLA's scholarly and educational missions and the State of California; and, to lead UCLA's research community to bring innovation to market.

The mission of the Office of the Vice Chancellor of Research and Creative Activities is to provide logistical support, policy guidance, strategic advice, and assistance in building relationships in furtherance of the UCLA research enterprise.

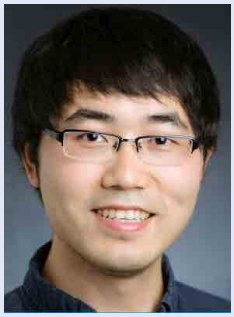
FIF pitches can be viewed here.

If you have any questions about the program, please email UCLA TDG at InnovationFund@tdg.ucla.edu. **IM**

UCLA FACULTY
INNOVATION FELLOWS 2021

SIERRA BURKHART
Academic Director, UCLA Geospatial and Michael Shin, Professor, Geography; Geograf.io Districting

WARREN COMULADA
Associate Professor, Psychiatry and Biobehavioral Sciences; A virtual reality experience to reduce anxiety in children prior to surgery



LIANG GAO
Assistant Professor, Bioengineering; High-resolution, real-time flash imaging Lidar systems

MING GUO
Professor, Neurology; MitoRejuvenation

MAHDI HASANI
Project Scientist, Dentistry & Bioengineering; uTheraPatch

IAN HOLLOWAY
Assistant Professor, Social Welfare; Gay Sexuality and Social Policy Institute

MONA JARRAHI
Professor, Electrical and Computer Engineering; Lookin Inc.

JUSTIN KARLIN
Assistant Professor, Stein and Doheny Eye Institutes; A novel serum tears preparation device

ROY WOLLMAN
Professor, Chemistry & Biochemistry; BioCartography

UCLA TDG

XR in the Arts and Humanities

IN APRIL 2021, UCLA TDG HOSTED the XR in the Arts and Humanities: Extended Reality Research Projects and Pedagogy with VR, AR and MR. The webinar showcased the UCLA XR Initiative (XRI), and projects by its associate faculty in the Arts and Humanities. Working with XR technologies of virtual (VR), augmented (AR), and mixed (MR) realities, their work spans research, performance, app development, and classroom pedagogy.

PROJECT DETAILS AND TEAMS

Anthony Caldwell

Joy Guey

UCLA Architectural Reconstructions on Broadway Project documents the historic records and theater buildings in order to better understand the architectural practices surrounding these landmarks and to support their conservation. Team: Anthony Caldwell, Assistant Director UCLA Digital Research Consortium, Manager | Resident Technologist Scholarly Innovation Labs. Joy Guey, Emerging Technologies Advocate, UCLA Social Sciences Center for Education, Research, and Technology.

Jeff Burke

REMAP - The Center for Research in Engineering, Media and Performance (REMAP) is a joint effort of the School of Theater, Film and Television and Samueli School of Engineering that explores new, enriching cultural forms and empowering social situations enabled by the thoughtful interweaving of engineering, the arts and community development. REMAP will present recent work in Extended Reality (XR) live experiences. Team and Collaborators: Jeff Burke, Professor In-Residence, Theater and Director, UCLA REMAP, with UCLA TFT, UCLA Engineering and UCLA Anderson.

David Gere

Francesca Albrezzi

***Through Positive Eyes* at the Fowler Museum: A Virtual Exhibition Capture** - A collaborative photo-storytelling project by over a hundred people living with HIV and AIDS around the world. Team: David Gere, PhD Professor, UCLA Department of World Arts and Cultures/ Dance Director, UCLA Art & Global Health Center. Francesca Albrezzi, PHD Digital Research Consultant, UCLA Office of Advanced Research Computing.

Annelie Rugg

Tom Garbelotti

Maja Manojlovic

Scribe VR is a concept for an app to immersively compose, ideate, and creatively express oneself in a 360 space. Team: Annelie Rugg, Director and Humanities CIO at Humanities Technology. Tom Garbelotti, Instructional Technology Manager at Humanities Technology. Maja Manojlovic, Continuing Lecturer, Faculty Advisor for WII Pedagogy, UCLA Writing Programs.

Stephen Mamber

3D in VR - Using 3D Movies to Understand VR - A developing teaching application using 3D films to explore differences that VR has from conventional visual media. Team: Stephen Mamber Research Professor, UCLA Dept. of Film, Television, and Digital Media Cinema and Media Studies Program. mamber.filmtv.ucla.edu

Danny Snelson

Breaking the Zoom Barrier: XR Experiments in Pedagogy & Production - Danny Snelson discusses recent developments in remote teaching with XR platforms in the arts and humanities using examples from courses offered over the past year. Team: Danny Snelson, Assistant Professor, UCLA Department of English, featuring XR projects created by students in the Department of English.

Steve Anderson

VirtualX mobilizes the unique affordances of Virtual Reality (VR) to invite reflection on how the environment shapes students' feelings of belonging and inclusion at UCLA. Team: BruinX team in UCLA's Office of Equity, Diversity and Inclusion, created by faculty and students in the departments of Film, Television & Digital Media and Design Media Arts and directed by Professor Steve Anderson.

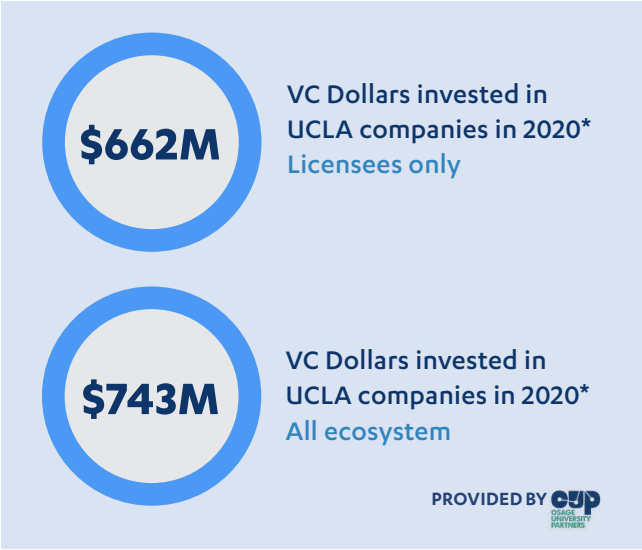
XR in the Arts and Humanities: Extended Reality Research Projects and Pedagogy with VR, AR and MR

UCLA TDG

HERE ARE XR RESOURCES TO EXPLORE

XRI Website
VR Hubs Environment
Recording of XR Webinar
Youtube Playlist of Presentation Videos
Mozilla Hubs Tutorial

UCLA Companies
funded $743M combined



AN IMPRESSIVE NUMBER OF COMPANIES, whose tech has been invented and licensed from UCLA, were funded during 2020 according to a report by Osage University Partners (OUP). This included 3 Accelerators/Incubators, 4 Seed Rounds, 20 companies funded by venture capital and 4 companies funded by Angel investors. The $662M is a combined figure that was received by 31 various UCLA companies in a broad range of industry sectors that include biopharma, cleantech, medtech, and software. Of the 31 companies, seven companies raised over $10M in a funding round and six companies raised between $2M - $10M in a funding round. Overall $743M was invested in UCLA companies in 2020. UCLA Technology Development Group negotiates the IP licenses to these technologies and facilitates introductions to management and investors.
IM

INNOVATION FUND

UCLA TECHNOLOGY DEVELOPMENT GROUP

CONGRATULATIONS TO OUR 2020 UCLA INNOVATION FUND AWARDEES

TRACK 1 THERAPEUTICS

Restoring Neuronal Function in Intellectual Disability Syndromes

WILLIAM LOWRY, PHD; MICHAEL JUNG, PHD; BENNETT NOVITCH, PHD; VALERIE ARBOLEDA, MD, PHD

3D Design of Antisense Oligonucleotide Drugs

FENG GUO, PHD; CARRIE MICELI, PHD; FLORIAN BARTHÉLÉMY, PHD; YAN LI

***In situ* Vaccination with CXCL9/10 Gene-Modified Dendritic Cells for Advanced Stage Non-Small Cell Lung Cancer**

STEVEN DUBINETT, MD; BIN LIU, PHD; RAYMOND LIM

TRACK 2 MEDTECH

Synthetic Polypeptide Hydrogels as Next Generation Dermal Fillers

MICHAEL DELONG, MD; TIMOTHY DEMING, PHD

Novel Vaginal Drug Delivery

LEENA NATHAN, MD; TAMARA GRISALES, MD; SONG LI, PHD

Non-Invasive Treatment for Sleep-Disordered Breathing, Hypoventilation, and Hypertension

RONALD HARPER, PHD; ROBERT STRETCH, MD; MICHELLE ZEIDLER, MD

MISSION

The UCLA Innovation Fund's goal is to more quickly move technologies from idea to the market, bridging the gap between academia and industry/investor interest.

The UCLA Innovation Fund focuses on commercialization activities not supported by basic research grants, solicits feedback from external industry/investors, and provides dedicated project management.

For more information on the UCLA Innovation Fund contact

INNOVATIONFUND@TDG.UCLA.EDU

https://tdg.ucla.edu/UCLA-innovation-fund

UCLA TDG Board of Directors

WILLIAM MITCHELL, CHAIRMAN
Founding Partner, Sequel Ventures Partners, LLC

TOM UNTERMAN, CHAIRMAN EMERITUS
Founding Partner, Rustic Canyon Partners

NORMAN ABRAMS
Distinguished Professor of Law Emeritus, UCLA Law

FABRIZIO BONANNI
Executive Vice President, Amgen (Ret.)

MICHAEL J. CLEARE
Associate Vice Provost for Research,
University of Pennsylvania

MICHAEL DAL BELLO
Investment Partner of Healthcare,
Pritzker Private Capital

SYLVIO DROUIN
Senior Vice President Research Labs, Unity Technologies

JUDY GASSON
Senior Advisor, UCLA David Geffen School of Medicine

DAVID GILMAN
Partner, ClearView Healthcare Partners

CARL E. GULBRANDSEN
Former Managing Director/CEO, Wisconsin Alumni Research Foundation (WARF)

THOMAS HERGET
Head, Silicon Valley Innovation Hub

EVA HO
Partner, Fika Ventures

ANDREI IANCU
Partner, Irell & Manella LLP, former Under Secretary of Commerce for Intellectual Property and Director of US Patent and Trademark Office

AYA JAKOBOVITS
Founder, President, CEO and Director, Adicet Bio, Inc.

RAJIT MALHOTRA
Co-Founder & Executive Chairman, Dyve Biosciences

JOHN T. MAPES
Managing Partner, Aurora Capital Partners

JENNIFER MNOOKIN
Dean, Ralph and Shirley Shapiro Professor of Law,
Faculty Co-Director, PULSE@UCLA Law

AL OSBORNE
Professor and Faculty Director,
Price Center for Entrepreneurship & Innovation,
UCLA Anderson School of Management

ROBERT PACIFICI
Chief Scientific Officer, CHDI Foundation

MATTHEW PENDO
Managing Director, Head of Corporate Development and Capital Markets, Oaktree

JESSICA RICHTER
Chief Operating Officer, Experien Group

BARBARA K. SOSNOWSKI
Vice President and Global Head, Emerging Science & Innovation Leads, WWRDM, Pfizer

UCLA TDG Executive Staff

AMIR NAIBERG
Associate Vice Chancellor, CEO and President

TIM GRAUERHOLZ
Chief Financial Officer and Chief Operations Officer

DINA LOZOFSKY
Senior Director of Business Development,
Physical Sciences and Engineering & MedTech

MARK WISNIEWSKI
Senior Director, Biopharmaceuticals

ANGELA KUJAK
Senior Director of Contracts

THOMAS LIPKIN
Director of UCLA Innovation Fund and New Ventures

BRIAN ROE
Director of Industry Research and Material Transfer

LAURA VAN NOSTRAND
Director of Human Resources

UCLA TECHNOLOGY DEVELOPMENT GROUP

UCLA Technology Development Group (TDG) promotes UCLA innovation, research, education and entrepreneurship to benefit society. Working with UCLA TDG helps facilitate the translation of UCLA discoveries into new products and services that create economic value to support UCLA's scholarly and educational missions. The UCLA TDG office manages a large portfolio of technologies and license agreements and has a rich history of startup company formation.

For more information, please visit: TDG.UCLA.EDU

10889 Wilshire Blvd., Suite 920, Los Angeles, CA 90095
310.794.0558 | marketing@tdg.ucla.edu | www.tdg.ucla.edu

Connect with us @ UCLATDG