

A photograph of a middle-aged man with short grey hair and glasses, wearing a white lab coat over a blue and white checkered shirt. He is looking down at a green plant he is holding in his hands. The background is a laboratory with shelves and equipment.

UNIVERSITY
OF
CALIFORNIA

Technology Commercialization Report

2021

OUTSIDE FRONT PHOTO:

Prof. Brian Staskawicz, Director of Sustainable Agriculture at Berkeley's Innovative Genomics Institute (IGI), inspects immature wheat stalks. The Staskawicz lab is expanding CRISPR-Cas genome editing technology in plants to increase drought tolerance and disease resistance. Alex Schultink, a former Ph.D. student and postdoc of Staskawicz, received support from IGI's Entrepreneurial Fellows Program in translating and commercializing their shared innovations. Alex founded and now leads the startup Fortiphyte to bring these technologies to market. *Photo credit: Elena Zhukova / UC Berkeley*

INSIDE FRONT PHOTO:

Prof. Gaurav Sant, founder and Director of UCLA's Institute for Carbon Management (ICM), holds concrete samples composed partially of carbon dioxide. Across a broader portfolio, ICM seeks to reduce the carbon footprint of concrete construction by emphasizing carbon dioxide utilization in concrete. Sant founded startup CarbonBuilt to commercialize this technology. It's a model for other carbon removal projects at the institute — moving discoveries from bench to prototype that quickly make a big impact. *Photo credit: UCLA Samueli School of Engineering*

OUTSIDE BACK PHOTO:

Lower limb prosthesis built by UC San Diego startup LIMBER Prosthetics. Co-founded by Joshua Pelz and Luca De Vivo Nicoloso, recent Ph.D.s and current postdocs, LIMBER evolved from their doctoral research with Prof. Falko Kuester. Their startup brings together imaging, modeling, simulation testing and 3D-printing to create low-cost, one-piece prostheses that can be tailored to their users. LIMBER receives support from campus incubators and accelerators as it moves toward commercialization. *Photo credit: Erik Jepsen/UC San Diego Communications*



Message from the Vice President



Although UC research and innovation activities are nearly back in business across the system, the relentless COVID-19 pandemic was still significantly at play on all of our activities in FY 2021. Nevertheless, UC innovators worked throughout the pandemic in the period covered by this report. They met the challenges of lab shutdowns and restarts, while handling the transition from in-person classes to remote instruction. They also responded to the continued impacts of climate change, most notably to the surge of California wildfires.

Other UC leaders and I spearheaded an effort to facilitate greater collaboration on COVID-19 research among scientists and researchers across UC's five medical centers, three national laboratories and 10 campuses. UC provided \$2 million in seed funding to scientists to accelerate urgently needed breakthroughs. Projects were prioritized by those with a strong potential for impacting the pandemic in the near term, the ability of researchers to start work right away, and a research focus that would help California's most vulnerable populations.

UC innovators were active beyond our collective response to COVID-19. Together with Berkeley Lab we partnered in 2020 with the California Energy Commission on the CalTestBed Program, which aims to connect cleantech entrepreneurs with next stage investors to expedite their pathway to commercialization. UC campuses have made their expertise and facilities available for this endeavor. UC also launched a program with Cornell University called the CA-NY Climate Innovation Highway, to foster research and development for impact, leading two of the world's largest economies (NY and CA) as they transition toward negative carbon emissions.

Campus technology transfer offices never wavered from their mission to protect and commercialize researchers' intellectual property and to promote entrepreneurial activities centered on campus inventions. Instead, the FY2021 metrics compiled in this report show an overall increase in income and distributions from FY2020. Invention disclosures, filings and patents issued were also higher. Everyone adapted to a remote work and education model while continuing to move our technologies from lab to market and public benefit.

This model of resilience is one we will lean upon as we encounter future crises, such as climate change and its interrelated impacts on society. We will continue to develop and apply UC's innovation capabilities to meet such challenges.

Sincerely,

Theresa A. Maldonado, Ph.D., P.E.
Vice President, Research & Innovation

This report documents University of California intellectual property activities for fiscal year 2021. Through a collaborative management approach, UC's Office of the President (UCOP), all ten UC campuses and the Lawrence Berkeley National Laboratory (LBNL) share responsibility for these activities. The extraordinary innovations generated by our researchers originate at the campuses, affiliated medical centers and LBNL. Each campus or lab actively manages its invention portfolio, fosters relationships between inventors and industry, and nurtures entrepreneurs through its technology commercialization office.

LBNL is a DOE national laboratory managed by UC. Its operations differ from those on the campuses in certain respects. LBNL's fiscal year runs from October to September; UC's fiscal year runs from July to June. UC campus offices contract with attorneys at outside law firms for all patent prosecution activity; LBNL manages most US patent filings internally through its own legal department and contract out only for selected matters, such as foreign prosecution. LBNL maintains proprietary databases that track its intellectual property activities. This report includes LBNL data separately and in systemwide totals.

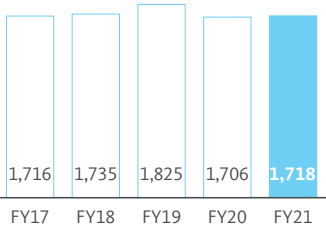
UCOP manages a small portfolio of laboratory inventions from LBNL and Lawrence Livermore National Laboratory (LLNL). Most of these cases involve UC co-inventors. The metrics derived from these inventions are not displayed separately - they are included in the systemwide totals.

UC Startups counted in this report meet the following criteria: a legally organized and/or incorporated company that acquired rights to UC technology under a license, option, or letter of intent; this agreement was essential to the startup's formation; the startup was founded to develop products and/or services based on UC technology; the startup operated independently of any pre-existing company when formed; the startup's operations are not integrated into the operations of another company.

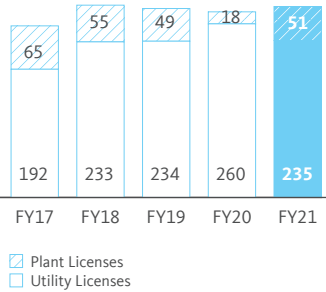
All charts indicate systemwide figures, unless otherwise noted.

Metrics

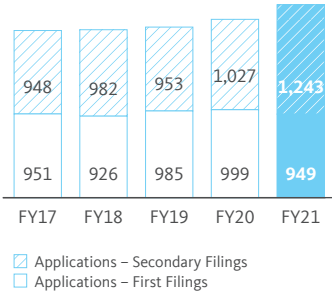
INVENTIONS DISCLOSED



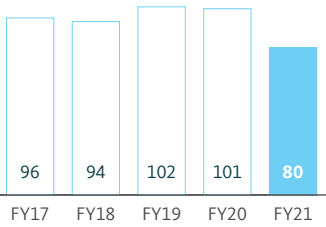
LICENSES ISSUED



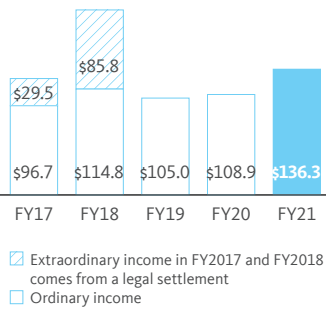
U.S. PATENT APPLICATIONS FILED



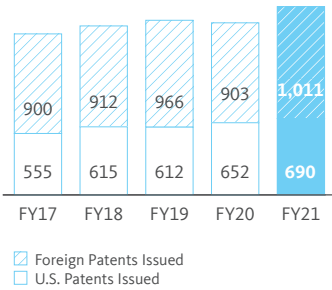
STARTUP COMPANIES FORMED (BY CAMPUS, FY 2021)



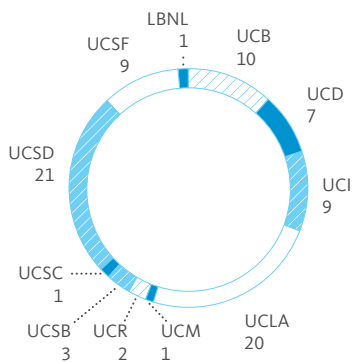
ROYALTIES, FEES & OTHER INCOME (in millions)



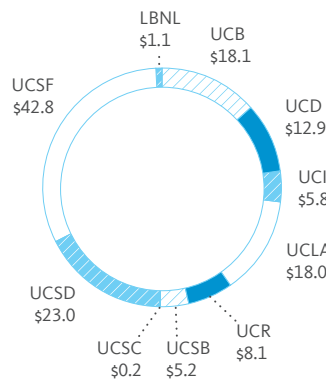
PATENTS ISSUED



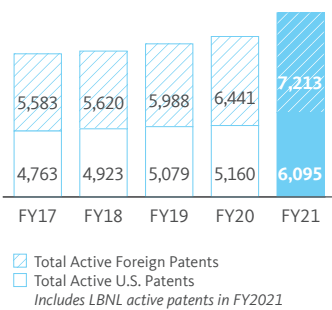
STARTUP COMPANIES FORMED (BY CAMPUS), FY 2021



ROYALTIES, FEES & OTHER INCOME (BY CAMPUS), FY 2021 (in millions)



TOTAL ACTIVE PATENTS



Campus numbers may include startups formed by more than one campus.

Campus totals do not include \$1.1 million from previous National Laboratory inventions and other income credited to UCOP.

Highlights

1,718

New inventions disclosed by UC researchers in 2021

235

New licenses for UC's utility inventions in 2021

51

New licenses for UC plant cultivars in 2021

80

New startups formed in 2021 based on UC technologies

1,502

Startups formed since 1980 based on UC technologies

\$136.3M

Total income for UC in 2021 from technology commercialization

2,192

U.S. patent applications filed based on UC inventions in 2021

690

U.S. patents issued for UC inventions in 2021

6,095

Active U.S. patents covering UC inventions

1,011

Foreign patents issued for UC inventions in FY2021

7,213

Active foreign patents covering UC inventions

Top-earning inventions

INVENTIONS FY 2021 (campus)	TOTAL INCOME (in thousands)
Opto-Electropositioning Microfluidic Chips (UCB & UCLA)	\$16,997
CAR T Cell Therapy for Cancer (UCSF)	\$13,738
Nephropathic Cystinosis Treatment (UCSD)	\$10,826
Tango Mandarin (UCR)	\$6,651
Bovine Growth Hormone (UCSF)	\$5,000
Subtotal (Top 5 Inventions)	\$53,212
Micro Implant to treat Glaucoma (UCI)	\$4,251
Hepatitis-B Vaccine (UCSF)	\$3,832
Macromolecules for Drug/Diagnostic Delivery (UCSD)	\$3,764
Monterey Strawberry (UCD)	\$2,238
Golden Hills Pistachio (UCD)	\$1,964
Fronteras Strawberry (UCD)	\$1,938
Gene-editing Tools and Reagents (UCB & UCSF)	\$1,925
Tissue Oxygenation (UCSF)	\$1,895
Cellular Libraries for Peptide Sequences (UCSB)	\$1,489
Shatterproof Seed Pods (UCSD)	\$1,271
Therapeutic Ocular Surface Boundary Lubricant (UCSD)	\$1,125
Chromosome Painting (LLNL & LBNL & UCSF)	\$1,107
San Andreas Strawberry (UCD)	\$993
Tunable Fluorescent Polymers (UCSB)	\$977
Albion Strawberry (UCD)	\$908
Walnut Rootstocks (UCD & UCR)	\$883
Portola Strawberry (UCD)	\$838
Single/Multiple Field Gates for Transistors (UCSB)	\$560
Attention Treatment for Pediatric ADHD (UCSF)	\$456
Lost Hills Pistachio (UCD)	\$399
Subtotal (Top 25 Inventions)	\$86,025
Total (All Inventions)	\$136,256
% of Total from Top 5 Inventions	39.1%
% of Total from Top 25 Inventions	63.1%

This list is limited to revenue-generating inventions that have been commercialized.

UC Technology Commercialization Program – FY2021

Summary Table

	UCB	UCD	UCI	UCLA	UCM	UCR	UCSB	UCSC	UCSD	UCSF	LBNL	UC system	% change from FY20
Inventions¹													
Inventions Disclosed	186	136	131	354	5	48	51	41	441	165	90	1,718	0.7%
Patent Prosecution¹													
U.S. Applications Filed													
First Filings	111	63	82	213	3	27	38	22	201	134	44	949	(7.6%)
Secondary Filings	177	100	97	315	7	35	54	36	172	216	59	1,243	21.0%
Total U.S. Filings	288	163	179	528	10	62	92	58	373	350	103	2,192	6.7%
First Foreign Filings	88	46	38	171	4	13	25	13	92	119	18	617	2.8%
Patents Issued													
U.S. Patents Issued	118	46	40	161	3	22	25	25	117	67	70	690	5.8%
Total Active U.S. Patents	840	493	639	1,157	19	221	476	196	972	591	557	6,095	N/A
Foreign Patents Issued	98	78	50	226	0	36	48	35	181	202	62	1,011	12.0%
Total Active Foreign Patents	914	714	533	1,733	14	307	366	153	1,229	1,190	221	7,213	N/A
Licensing¹													
Letters of Intent (LOI) Issued	24	9	13	21	2	2	12	0	18	15	2	115	(13.5%)
Options Issued	9	9	5	21	0	2	3	2	7	4	9	67	19.6%
Utility Licenses Issued	24	23	7	56	1	5	14	1	67	35	5	235	(9.6%)
Plant Licenses Issued	0	47	0	0	0	4	0	0	0	0	0	51	183.3%
Startup Companies¹													
Startup Companies Formed	10	7	9	20	1	2	3	1	21	9	1	80	(20.8%)
Royalties, Fees & Other Income (in thousands)²													
Extraordinary Income	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.0%
Earned Royalties (above minimum)	\$906	\$11,693	\$4,618	\$1,068	\$0	\$7,796	\$1,429	\$99	\$16,450	\$20,068	\$61	\$65,073	15.4%
Equity Income	\$8,198	\$0	\$0	\$14,322	\$0	\$0	\$549	\$0	\$41	\$1,873	\$0	\$24,984	6600.2%
Other Income (royalties, fees, misc)	\$9,027	\$1,210	\$1,144	\$2,586	\$0	\$294	\$3,247	\$69	\$6,490	\$20,816	\$1,053	\$46,200	(11.4%)
Total Income	\$18,131	\$12,903	\$5,762	\$17,977	\$0	\$8,090	\$5,225	\$168	\$22,981	\$42,757	\$1,115	\$136,256	25.1%
Distributions (in thousands)²													
Inventor Shares Distributed	\$1,596	\$4,454	\$2,359	\$4,100	\$0	\$3,300	\$4,980	\$400	\$6,253	\$9,134	\$377	\$37,251	15.5%


This table only reports technology commercialization activity governed by the UC Patent Policy for inventions managed by all UC technology commercialization offices, including LBNL. It does not include copyright, trademark and material transfer agreement activity that is also carried out by the campus and laboratory offices.

- 1 Technology commercialization activity related to inventions having one or more inventors at each campus/lab. A number of inventions involve inventors from multiple UC campuses and/or LBNL. Activity statistics for these inventions are reported multiple times, once for each campus/lab involved. Thus, for any given measure of activity, the sum of individual campus numbers may be greater than the systemwide totals reported in the right-hand column.
- 2 Financial activity related to inventions having one or more inventors at each campus/lab. A number of inventions involve inventors from multiple UC campuses and/or LBNL. Financial activity statistics for these inventions are pro-rated among the campuses and LBNL according to the number of inventors each campus/lab has. Since some financial activity reported here is credited to UC inventors who are not associated with a campus or with LBNL (including staff at other DOE laboratories), the sum of individual campus numbers may not equal the systemwide totals reported in the right-hand column.

UC Technology Commercialization Sites

Available Technologies	Website
Systemwide	techtransfer.universityofcalifornia.edu

Technology Commercialization Offices	Websites
UC Berkeley Intellectual Property & Industry Research Alliances (IPIRA)	ipira.berkeley.edu
UC Davis Innovation and Technology Commercialization (ITC)	itc.ucdavis.edu
UC Irvine UCI Beall Applied Innovation	innovation.uci.edu
UC Los Angeles (UCLA) Technology Development Group (TDG)	tdg.ucla.edu
UC Merced Office of Technology, Innovation, and Industry Relations (OTIIR)	otiir.ucmerced.edu
UC Office of the President Innovation Transfer & Entrepreneurship (ITE)	ucop.edu/innovation-entrepreneurship
UC Riverside Office of Technology Partnerships (OTP)	techpartnerships.ucr.edu
UC San Diego Office of Innovation and Commercialization (OIC)	innovation.ucsd.edu
UC San Francisco (UCSF) Innovation Ventures	innovation.ucsf.edu
UC Santa Barbara Technology & Industry Alliances (TIA)	tia.ucsb.edu
UC Santa Cruz Industry Alliances & Technology Commercialization (IATC)	officeofresearch.ucsc.edu/iatc
Lawrence Berkeley National Laboratory Intellectual Property Office (IPO)	ipo.lbl.gov



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