UNIVERSITY OF CALIFORNIA

Technology Commercialization Report

2023

COVER IMAGE:
The UC Irvine HORIBA Institute for Mobility and Connectivity (HIMaC) represents a collection of state-of-the-art research labs for conducting innovative research for the future of transportation, energy, and their interconnections. The focus is on sustainable transport based on zero-emission vehicles and supporting autonomous driving with vehicles and the grid utilizing electricity, hydrogen, and networking platforms. The institute is a public-private-government partnership with the mission to move these technologies forward. It is also a CalTestBed program participant, making accessible its world-class testing facilities for entrepreneurs developing innovations for the global clean energy economy.

INSIDE PHOTO:
The goal of the UC Riverside turfgrass breeding and genetics program is to develop new and improved cultivars with better winter color retention and drought resistance. New lines of these grasses are tested in various environments in California and across the Southern US under a wide range of conditions. The program is supported by UC Agriculture and Natural Resources (UC ANR), commercial associations, and regional water districts. Two superior bermudagrasses developed through this program will soon be released as commercial cultivars.

BACK PHOTO:
UC San Diego Professor Karen Christman pursues research in regenerative medicine, tissue engineering and drug delivery applications. Her lab's main goal is to develop minimally invasive therapies for cardiovascular diseases and women's health. Karen's research considers naturally occurring and synthetically derived hydrogels to repair and regenerate tissue. Dr. Christman is a co-founder of two startups developing a new class of biotherapeutics and devices: Ventrix focuses on harnessing the healing potential of the body's extracellular matrix for generating healthy tissue; Karios Technologies seeks to help prevent scar tissue caused by cardiac surgeries.

Message from the Vice President

The Office of Research and Innovation (R&I) is pleased to present the 2023 Technology Commercialization Report, which highlights UC accomplishments in innovation and entrepreneurship. Once again, UC remains on top with more U.S. utility patents granted in 2023 than any other university in the world, according to the National Academy of Inventors (NAI). The NAI also elected 12 UC researchers to the 2023 class of NAI Fellows. The European Patent Office also identified UC among its top 100 patent applicants in 2023, the only university in that ranking. Furthermore, royalty income and distributions increased from fiscal year 2022.

R&I's partnership with the state of California on climate action research resulted in multiple awards distributed in 2023. UC campuses and UC affiliates received $15 million in UC Climate Action Innovation & Entrepreneurship Awards, building on existing resources across the University. An additional $83.1 million in California Climate Action Seed Grants and Matching Grants funded 38 projects, collectively involving more than 130 community, industry, tribal, and public agencies, 12 UC locations, 11 California State University campuses, and two private universities. The two-year grants focus on projects that will aid California communities, particularly those most vulnerable to climate disasters or which have borne the brunt of historic inequities.

The successes of 2023 illustrate how UC always strives for excellence. Crises such as the COVID-19 pandemic or the state's current fiscal shortfall tests any organization. UC consistently exemplifies a university that persists through such situations and emerges stronger. Our perennial success in securing patents and getting inventions to market reflects how our investment in research impacts society's most intractable problems. Our entrepreneurial leadership demonstrates our collective commitment to ensuring that the fruits of UC research benefit all Californians.

Sincerely,

Theresa A Maldonado

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

This report documents University of California intellectual property activities for fiscal year 2023. 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.

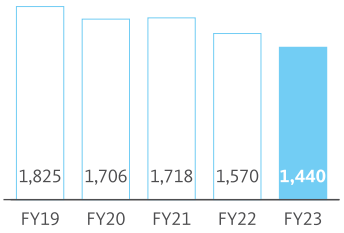
LBNL is a DOE national laboratory managed by UC. Its operations differ from those on the campuses in certain respects. LBNL's fiscal year runs from October to September; UC's fiscal year runs from July to June. UC campus offices contract with attorneys at outside law firms for all patent prosecution 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.

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.

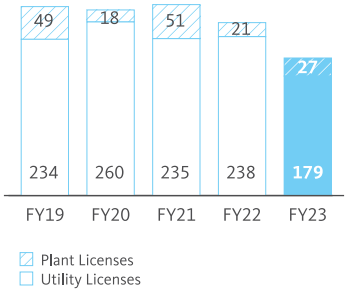
All charts indicate systemwide figures, unless otherwise noted.

Metrics

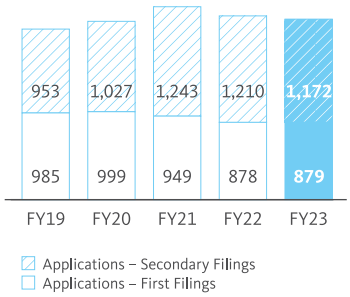
INVENTIONS DISCLOSED



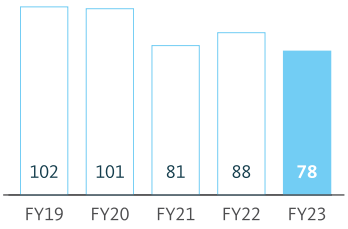
LICENSES ISSUED



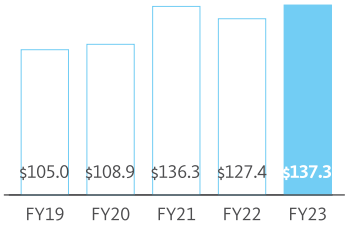
U.S. PATENT APPLICATIONS FILED



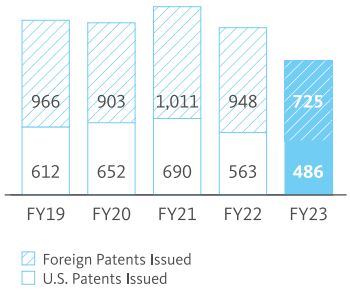
STARTUP COMPANIES FORMED



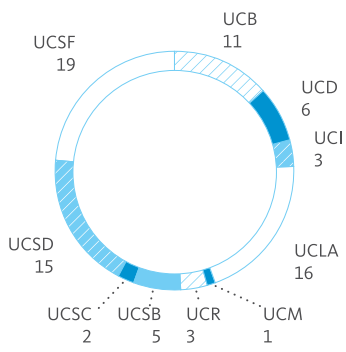
ROYALTIES, FEES & OTHER INCOME
(in millions)



PATENTS ISSUED

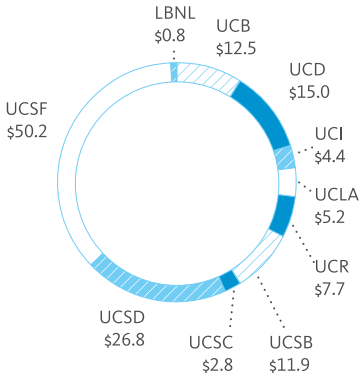


STARTUP COMPANIES FORMED (BY CAMPUS), FY 2023

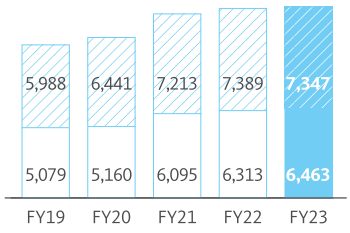


Campus numbers may include startups formed by more than one campus.

ROYALTIES, FEES & OTHER INCOME (BY CAMPUS), FY 2023
(in millions)



TOTAL ACTIVE PATENTS



Includes LBNL active patents in FY2021-23

Highlights

1,440
New inventions disclosed by UC researchers in 2023

2,051
U.S. patent applications filed based on UC inventions in 2023

179
New licenses for UC's utility inventions in 2023

486
U.S. patents issued for UC inventions in 2023

27
New licenses for UC plant cultivars in 2023

6,463
Active U.S. patents covering UC inventions

78
New startup companies formed in FY2023 based on UC inventions

725
Foreign patents issued for UC inventions in FY2023

$137M
Total income for UC in 2023 from technology commercialization

7,347
Active foreign patents covering UC inventions

Top-earning inventions

INVENTIONS FY 2023 (campus)	TOTAL INCOME *(in thousands)*
Nephropathic Cystinosis Treatment (UCSD)	$12,805
Strawberry Varietals (UCD)	$8,922
Mandarin Varietals (UCR)	$6,909
Macromolecules for Drug/Diagnostic Delivery (UCSD)	$4,877
Pistachio Varietals (UCD)	$3,141
Subtotal (Top 5 Inventions)	**$36,654**
Bovine Growth Hormone (UCSF)	$2,728
Hepatitis-B Vaccine (UCSF)	$2,400
Micro Implant to treat Glaucoma (UCI)	$2,332
Nanopore Sequencing Technology (UCSC)	$2,085
Tissue Oxygenation (UCSF)	$2,073
Tunable Fluorescent Polymers (UCSB)	$1,667
Lower Back Pain Relief Platform (UCSF)	$1,406
Nitrogen-Fixing Microbes for Agriculture (UCSF)	$1,357
Gene-editing Tools and Reagents (UCB & UCSF)	$1,107
Biomaterial for Tumor Therapy (UCLA)	$590
Irreversible Electroporation for Soft Tissue Ablation (UCB)	$542
Avocado Varietals (UCR)	$457
Breast Cancer Diagnostics & Therapeutics (UCSF)	$449
Single-Cell Sequencing Platform (UCSF)	$392
Walnut Rootstocks (UCD & UCR)	$370
Portable Osmometer (UCSD)	$289
Digital Microfluidics Platform (UCLA)	$263
Cognitive Curcumin Capsules (UCLA)	$246
Cannula for Brain Therapeutics Delivery (UCSF)	$205
Mammalian Taste Receptors (UCSD)	$200
Subtotal (Top 25 Inventions)	**$57,812**
Total (All Inventions)	**$137,258**
% of Total from Top 5 Inventions	**26.7%**
% of Total from Top 25 Inventions	**42.1%**

List of revenue-generating utility and plant inventions that have been commercialized.

UC Technology Commercialization Program – FY2023

Summary Table

	UCB	UCD	UCI	UCLA	UCM	UCR	UCSB	UCSC	UCSD	UCSF	LBNL	UC system	% change from FY22
Inventions[1]													
Inventions Disclosed	161	124	106	272	8	56	68	35	392	216	25	1,440	(8.3%)
Patent Prosecution[1]													
U.S. Applications Filed													
First Filings	117	75	68	184	8	41	56	24	168	129	18	879	0.1%
Secondary Filings	154	124	114	272	4	49	44	57	164	193	9	1,172	(3.1%)
Total U.S. Filings	**271**	**199**	**182**	**456**	**12**	**90**	**100**	**81**	**332**	**322**	**27**	**2,051**	**(1.8%)**
First Foreign Filings	93	60	45	133	2	16	19	19	109	86	8	577	(1.9%)
Patents Issued													
U.S. Patents Issued	73	41	30	112	3	10	17	27	104	72	7	486	(13.7%)
Total Active U.S. Patents	**853**	**543**	**665**	**1,276**	**23**	**219**	**409**	**220**	**1,100**	**686**	**579**	**6,463**	**2.4%**
Foreign Patents Issued	98	41	29	310	0	9	24	7	82	120	15	725	(23.5%)
Total Active Foreign Patents	**1,042**	**661**	**554**	**2,228**	**12**	**298**	**380**	**177**	**562**	**1,391**	**160**	**7,347**	**(0.6%)**
Licensing[1]													
Letters of Intent (LOI) Issued	19	11	16	24	2	0	8	0	8	13	1	98	(23.4%)
Options Issued	7	5	6	15	0	1	7	3	1	7	4	54	5.9%
Utility Licenses Issued	17	12	8	30	1	6	3	2	67	30	5	179	(24.8%)
Plant Licenses Issued	0	24	0	0	0	3	0	0	0	0	0	27	28.6%
Startup Companies[1]													
Startup Companies Formed	11	6	3	16	1	3	5	2	15	19	0	78	(11.4%)
Royalties, Fees & Other Income *(in thousands)*[2]													
Earned Royalties (above minimum)	$1,047	$13,010	$2,735	$991	$0	$7,554	$1,616	$2,152	$20,084	$8,583	$45	$57,820	(4.8%)
Equity Income	$1,291	$0	$0	$780	$0	$0	$0	$0	$0	$4,784	$0	$6,855	(71.2%)
Other Income (royalties, fees, misc)	$10,124	$2,004	$1,699	$3,402	$6	$125	$10,246	$642	$6,754	$36,793	$773	$72,583	69.3%
Total Income	**$12,462**	**$15,015**	**$4,434**	**$5,174**	**$6**	**$7,679**	**$11,862**	**$2,794**	**$26,839**	**$50,160**	**$819**	**$137,258**	**7.7%**
Distributions *(in thousands)*[2]													
Inventor Shares Distributed	$7,532	$5,051	$2,003	$2,595	$0	$3,854	$2,073	$1,670	$9,251	$9,328	$293	$43,697	(8.2%)

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 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 Technology Transfer Office (TTO)	research.ucdavis.edu/technology-transfer
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 Innovation & Business Engagement Hub	innovation.ucsc.edu
Lawrence Berkeley National Laboratory Intellectual Property Office (IPO)	ipo.lbl.gov

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