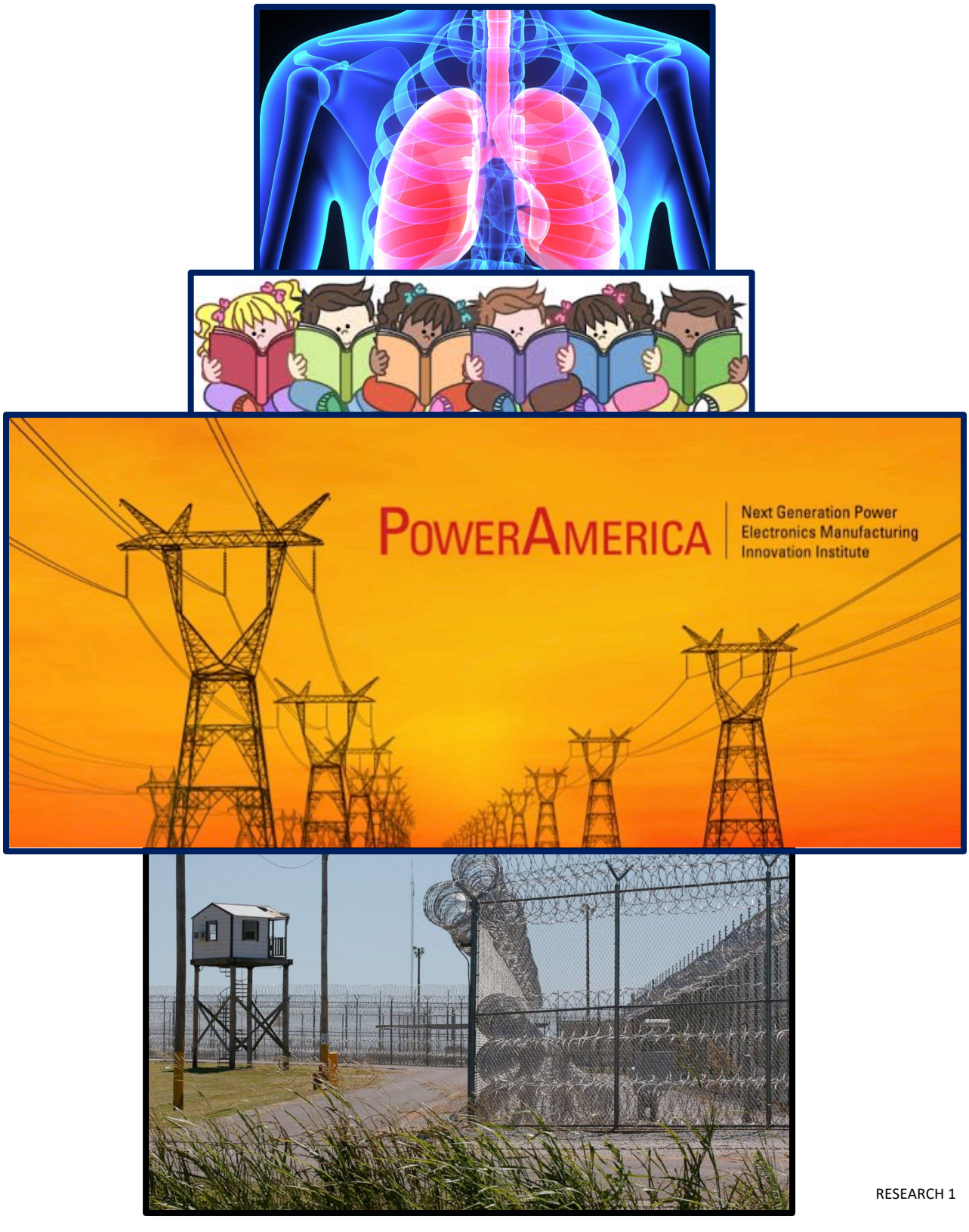
The University of Akron

Report to the Board of Trustees
April 2020

RESEARCH & SCHOLARLY ACTIVITIES



Research and Scholarly Activities Highlights

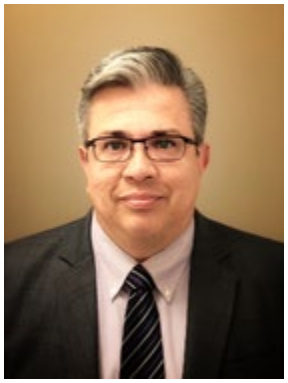
UA's elementary teacher preparation program – one of the best in the nation

The University of Akron's undergraduate elementary teacher preparation program is being recognized as one of the best in the nation, and the top in the state, for how it prepares educators to teach children reading, a new report shows.

In the report by the National Council on Teacher Quality (NCTQ), UA is one of only 15 undergraduate elementary programs across the United States, and the only one in Ohio, to earn an A+ rating due to exemplary coursework in teaching literacy, and for serving as a model of excellence for others. NCTQ is a nonpartisan, not-for-profit research and policy organization, known for its strong commitment to evidence-based reading instruction.

"This A+ rating from the National Council on Teacher Quality reflects decades of hard work by UA's literacy faculty," said **Dr. Lisa Lenhart**, professor of curricular and instructional studies and lead literacy faculty in the LeBron James Family Foundation College of Education. "All teacher candidates in early childhood, middle-level and special education must take 12 semester hours in the teaching of reading during their studies, so having a strong reading core program matters significantly. The A+ rating, and being recognized nationally, is a testament to our dedication and commitment to academic excellence."

Assessing the scope of witnessed violence in prisons



Dr. Robert Peralta, associate professor of sociology, with a research partner and co-author from Cleveland State University, conducted comprehensive interviews with male and female former prisoners from 19 different medium and maximum-security prisons throughout the state of Ohio. All respondents in the study indicated witnessing violent acts inflicted on others during their incarceration, ranging from weaponized and non-weaponized physical assaults, to sexual assault, to homicide.

This new research assesses the scope of violence witnessed by a sample of recently incarcerated individuals. Results call into question how the types of traumatic experiences documented in the data may impact mental health, undermine rehabilitation efforts and heighten risks for recidivism. Several policy reforms are also explored to assist with reducing the incidence of prison violence and its consequences.

Notable funding received in January and February 2020

Dr. Sailaja Paruchuri, with co-researcher **Dr. Adam Smith**, both associate professors of chemistry, received $380,000 from the National Institute of Allergy and Infectious Diseases, to study the integration of leukotriene and prostaglandin receptor signaling in mast cell activation and pulmonary inflammation during asthma.

Dr. Adam Smith, associate professor of chemistry, was awarded $102,000 as part of a National Eye Institute award to Case Western Reserve University, for the structure and function of plexin-co-receptor Interactions.

Dr. Yilmaz Sozer, professor of electrical and computer engineering, was awarded $225,000 as part of a U.S. Department of Energy award to North Carolina State University for the Next Generation Power Electronics Manufacturing Innovation Institute.

Dr. Qixin Zhou, assistant professor of chemical, biomolecular, and corrosion engineering, received a prestigious CAREER award, for $416,000, from the National Science Foundation for the study of structure-property-processing relationships for waterborne non-isocyanate thermal insulating coating.

Cover photos illustrate the breadth and depth of UA's research and scholarly activities as highlighted within this report.

Technology Transfer Highlights

UARF licenses technology to Akron-based RooSense LLC

UARF has licensed patents for a wearable fabric sensor that monitors a person's hydration levels during exercise or training to RooSense LLC, an Akron based startup company. The sensor technology was developed in Assistant Professor of Chemical, Biomolecular, and Corrosion Engineering **Chelsea Monty-Bromer**'s lab. Following the license, RooSense will be working to scale up sensor production and to test the overall sensor system with athletes in real world settings. To date, RooSense has raised $350,000 from the National Science Foundation, Ohio Third Frontier and Innovation Fund to bring the technology to market. RooSense's lab is located in Akron's Bounce Innovation Hub.

RooSense team tests its sweat sensor technology in collaboration with UA

UA spinout Ocius Technologies completes successful prototype

Ocius Technologies tests its 3mm analog chip for speed as compared to digital systems

Ocius Technologies, which was founded in 2014 by Emeritus Professor of Biomedical Engineering **Dale Mugler**, has implemented its first successful prototypes of analog chips that drastically speed up complex mathematical calculations. Mugler and his collaborators **Arjuna Madanayake**, **S.I. "Hari" Hariharan** and Soumyajit Mandal, recently completed the production of a 3 mm by 3 mm analog chip that can fit on a fingertip and makes calculations hundreds of times faster than its digital counterpart when linked to a digital computing mainframe. The chip could be integral in processing and calculating data to operate autonomous (driverless) vehicles, and significantly reduces the modeling time needed in researching nuclear fusion reactions. Ocius Technologies developed its prototypes with support from the U.S. Defense Advanced Research Projects Agency, which has awarded the company $1.65 million in STTR funding.

UARF's STRIDE Accelerator announces second cohort

STRIDE
HARD TECH ACCELERATOR

The University of Akron Research Foundation (UARF) recently launched the second round of its STRIDE Accelerator, a 5-month program that assists companies that are creating high-tech physical products, also known as "hard tech." Among the four companies selected for the accelerator are UA spinout companies RooSense and Precision Surface Science. Participating companies will learn best practices in building a minimum viable product, branding and marketing, sales strategy, accounting and financial projections, and pitching for investment. The STRIDE Accelerator is open to any startup company from Northeast Ohio and will be particularly helpful for university startups. The STRIDE Accelerator is currently funded by a $50,000 grant from the Burton D. Morgan Foundation and support from the JumpStart Entrepreneurial Network.

The University of Akron

Research and Sponsored Programs Activity: By Source and By College

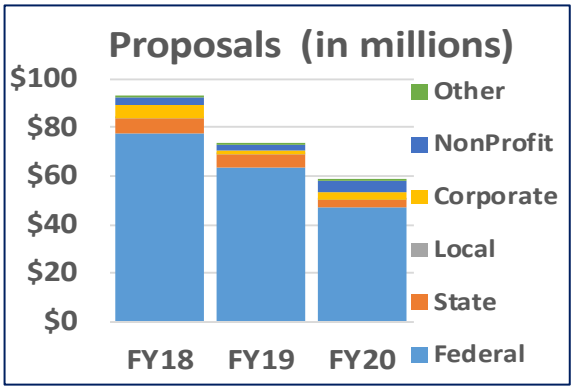
July 1, 2019 - February 29, 2020

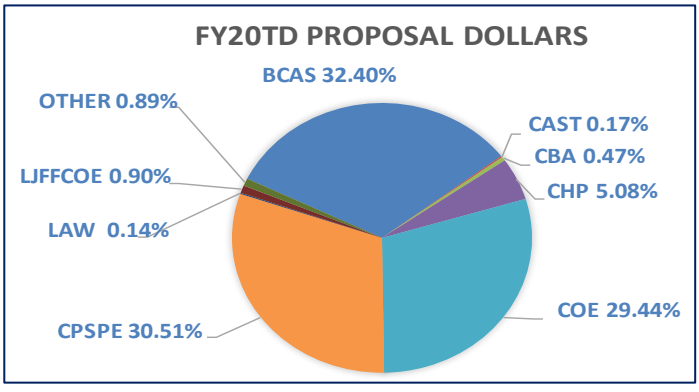
P R O P O S A L S (New and Continuing)

FY18	Count	Total $	Anticipated IDC $	Anticipated UA and Non-UA Cost Share $
Federal	189	$ 77,346,114	$ 22,279,765	$ 914,523
State	17	$ 6,252,073	$ 281,049	$ 3,459,272
Local	7	$ 165,907	$ 5,697	$ -
Corporate	51	$ 5,772,021	$ 1,463,827	$ -
NonProfit	37	$ 2,751,154	$ 160,540	$ 63,982
Other*	2	$ 547,447	$ 176,116	$ 32,994
Total	**303**	**$ 92,834,716**	**$ 24,366,994**	**$ 4,470,771**

FY19	Count	Total $	Anticipated IDC $	Anticipated UA and Non-UA Cost Share $
Federal	162	63,296,462	18,843,866	1,151,168
State	12	5,270,638	144,430	55,872
Local	3	90,455	5,152	-
Corporate	33	2,188,450	493,853	-
NonProfit	27	2,217,275	209,165	106,120
Other*	8	394,301	100,555	40,243
Total	**245**	**73,457,581**	**19,797,022**	**1,353,403**

FY20	Count	Total $	Anticipated IDC $	Anticipated UA and Non-UA Cost Share $
Federal	123	$ 47,104,602	$ 11,762,048	$ 1,043,626
State	13	$ 2,945,931	$ 261,125	$ 522,996
Local	4	$ 68,995	$ -	$ -
Corporate	37	$ 3,129,521	$ 489,042	$ -
NonProfit	45	$ 5,121,827	$ 874,549	$ 2,313,864
Other*	4	$ 374,380	$ -	$ 39,043
Total	**226**	**$ 58,745,255**	**$ 13,386,764**	**$ 3,919,529**





*Other is comprised of sponsor types: individual, non-U.S. government, and other universities.
This report may co-report with UA's Development Office.

The University of Akron

Research and Sponsored Programs Activity: by Source and by College

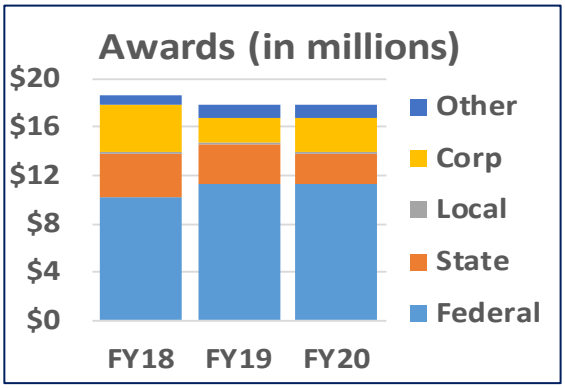
July 1, 2019 - February 29,2020

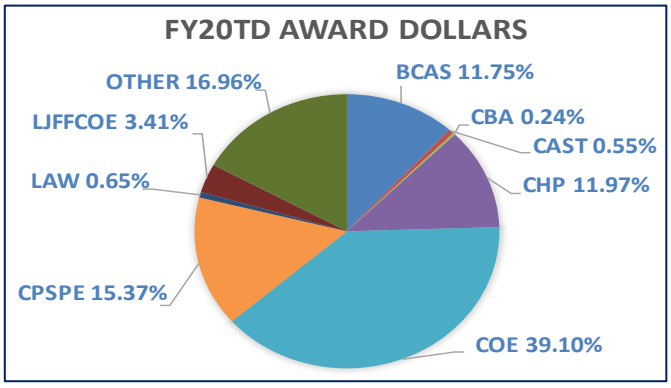
AWARDS

FY18	Count	Total $	Anticipated IDC $	Anticipated UA and Non-UA Cost Share $
Federal	80	$ 10,119,138	$ 2,552,290	$ 451,243
State	16	$ 3,684,710	$ 160,572	$ 2,245,350
Local	8	$ 130,323	$ 3,513	$ -
Corporate	48	$ 3,845,390	$ 898,621	$ 75,000
Other*	25	$ 828,206	$ 65,058	$ 94,463
Total	**177**	**$ 18,607,768**	**$ 3,680,054**	**$ 2,866,056**

FY19	Count	Total $	Anticipated IDC $	Anticipated UA and Non-UA Cost Share $
Federal	85	$ 11,361,497	$ 3,050,785	$ 300,627
State	11	$ 3,239,904	$ 130,563	$ 97,635
Local	3	$ 96,021	$ 5,152	$ -
Corporate	35	$ 2,091,291	$ 561,429	$ -
Other*	20	$ 996,808	$ 48,184	$ 94,347
Total	**154**	**$ 17,785,521**	**$ 3,796,113**	**$ 492,609**

FY20	Count	Total $	Anticipated IDC $	Anticipated UA and Non-UA Cost Share $
Federal	67	$ 11,270,095	$ 2,471,994	$ 403,477
State	10	$ 2,508,257	$ 28,973	$ 2,210,800
Local	6	$ 110,566	$ 3,302	$ -
Corporate	37	$ 2,838,107	$ 716,965	$ -
Other*	32	$ 1,105,335	$ 35,511	$ 90,702
Total	**152**	**$ 17,832,359**	**$ 3,256,745**	**$ 2,704,979**





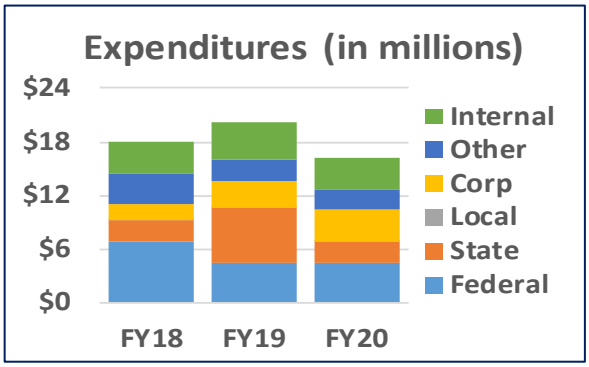
*Other is comprised of sponsor types: foundation/nonprofit, individual, non-U.S. government, and other universities. This report does not include testing agreements. Also, this report may co-report with UA's Development Office.

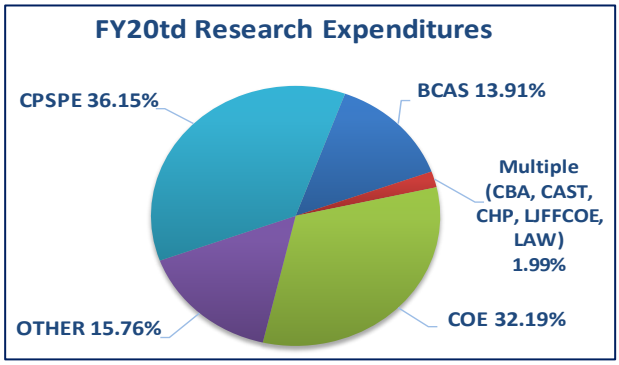
RESEARCH EXPENDITURES

FY18	Total $	Actual IDC $	Actual Cost Share $
External	**$ 14,341,753**	**$ 2,825,739**	**$ 1,834,608**
Federal	$ 6,768,320	$ 1,763,362	$ 159,652
State	$ 2,506,820	$ 208,335	$ 836,502
Local	$ 5,251	$ -	$ 3,217
Corporate	$ 1,651,444	$ 494,298	$ 100,788
Other*	$ 3,409,919	$ 359,744	$ 734,449
Internal	**$ 3,630,305**	**$ -**	
Grand Total	**$ 17,972,058**	**$ 2,825,739**	**$ 1,834,608**

FY19	Total $	Actual IDC $	Actual Cost Share $
External	**$ 15,928,023**	**$ 2,684,843**	**$ 2,631,126**
Federal	$ 4,471,044	$ 1,303,704	$ 103,195
State	$ 6,198,991	$ 186,816	$ 2,073,684
Local	$ 48,631	$ -	$ 23,781
Corporate	$ 2,907,191	$ 884,814	$ 78,415
Other*	$ 2,302,168	$ 309,509	$ 352,050
Internal	**$ 4,208,500**	**$ -**	
Grand Total	**$ 20,136,523**	**$ 2,684,843**	**$ 2,631,126**

FY20	Total $	Actual IDC $	Actual Cost Share $
External	**$ 12,550,751**	**$ 2,629,429**	**$ 2,305,035**
Federal	$ 4,367,226	$ 1,308,887	$ 59,362
State	$ 2,514,371	$ 21,275	$ 1,952,742
Local	$ 29,188	$ -	$ 18,385
Corporate	$ 3,483,575	$ 996,463	$ 39,219
Other*	$ 2,156,391	$ 302,803	$ 235,328
Internal	**$ 3,579,913**	**$ -**	
Grand Total	**$ 16,130,664**	**$ 2,629,429**	**$ 2,305,035**



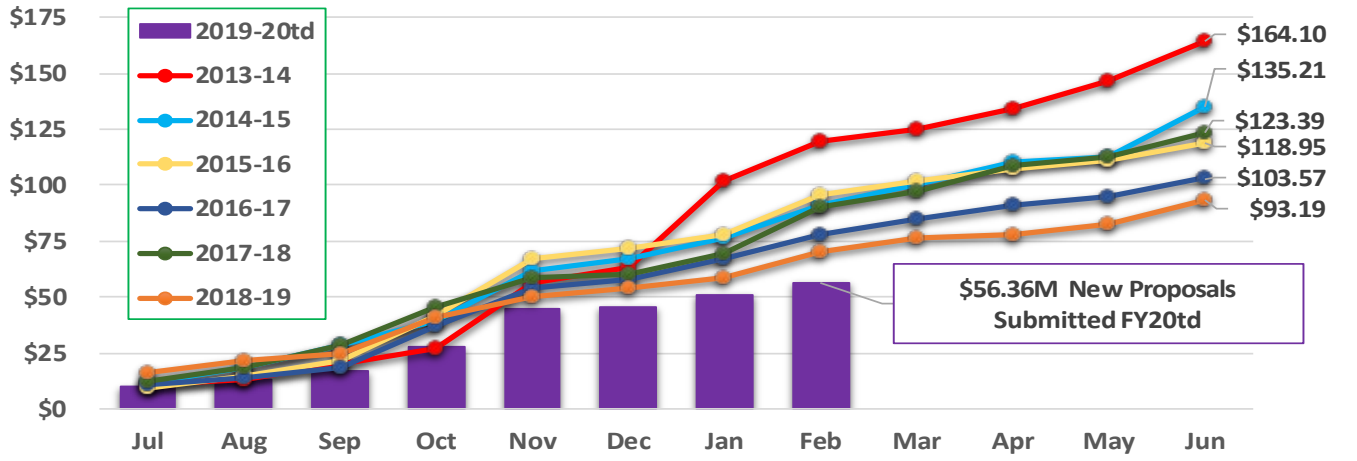


*External Other sponsor types are foundation/nonprofit, individual, non-U.S. gov't. and other universities. This page reports research expenditures only. Internal research expenditures include research-related accounts, such as startup funding.

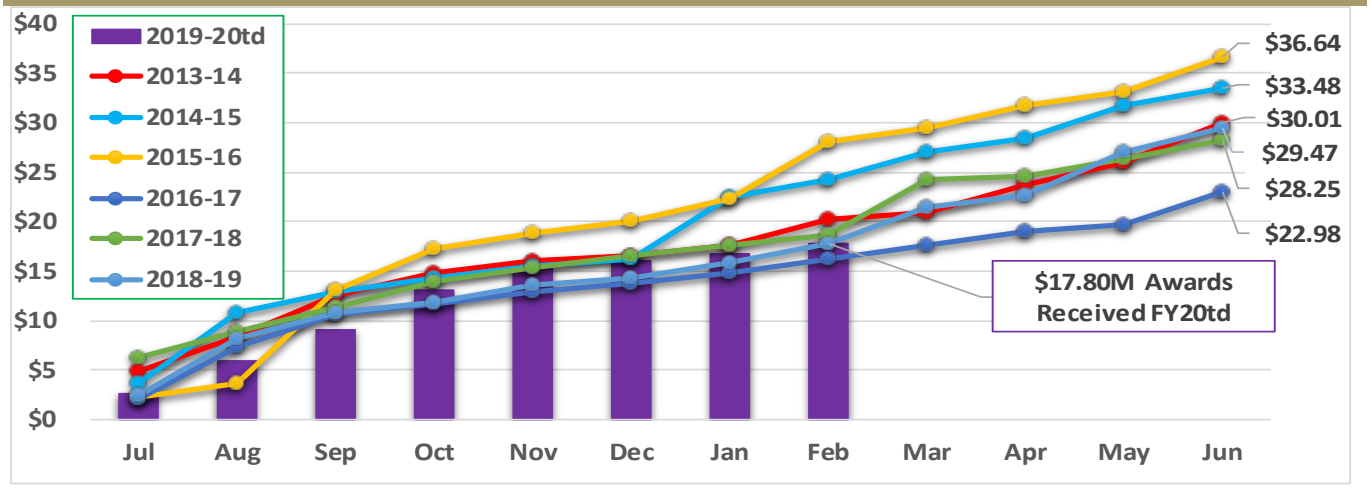
Fiscal Years 2014-2019 and FY20-to-date

(dollars in millions)

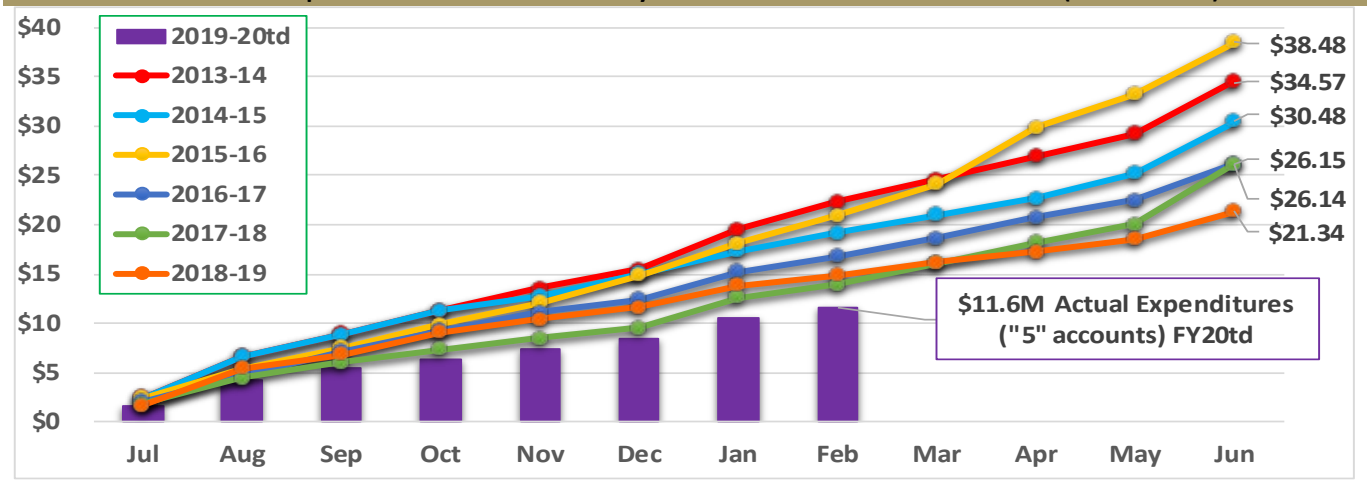
Cumulative New Proposal Dollars Sought



Cumulative New Dollars Awarded

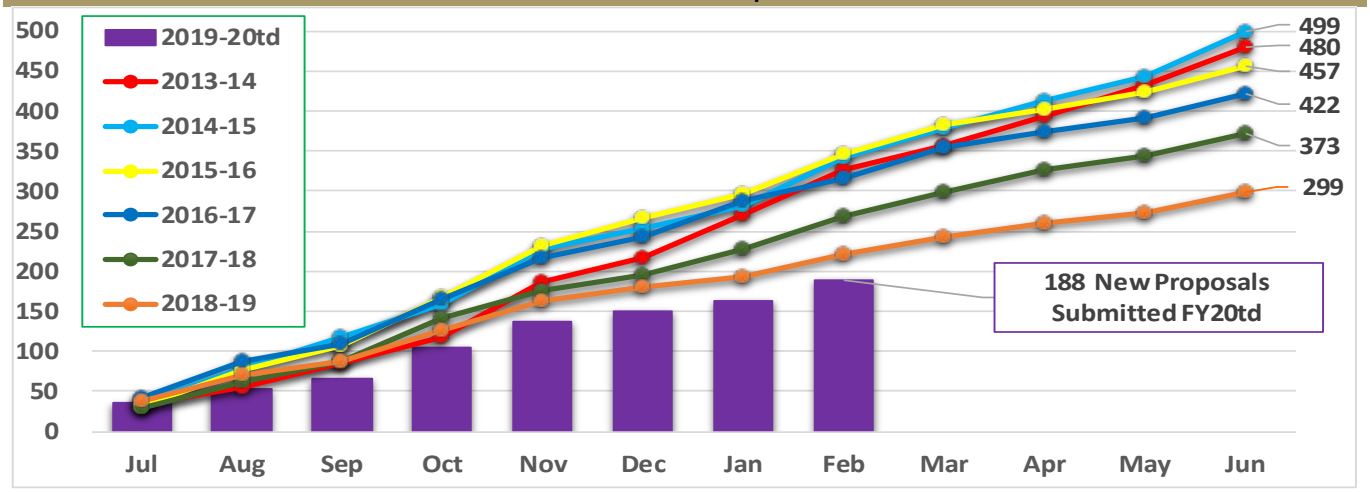


Cumulative Expenditure Dollars on Externally-Funded Research and Other Awards ("5" accounts)

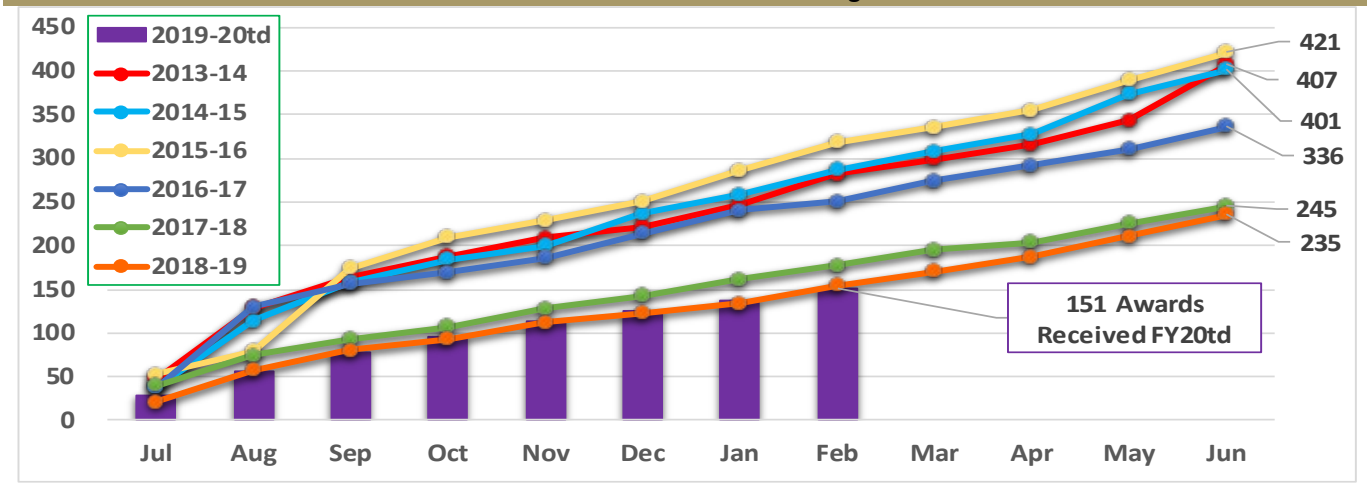


Fiscal Years 2014-2019 and FY20-to-date

Cumulative Count of New Proposals Submitted

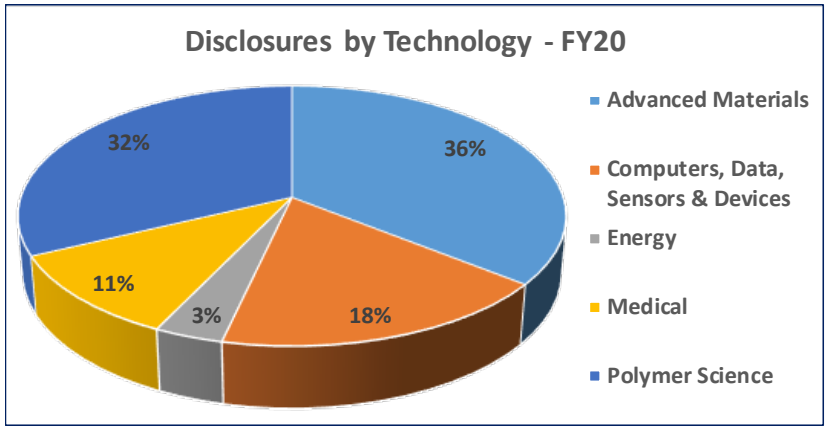


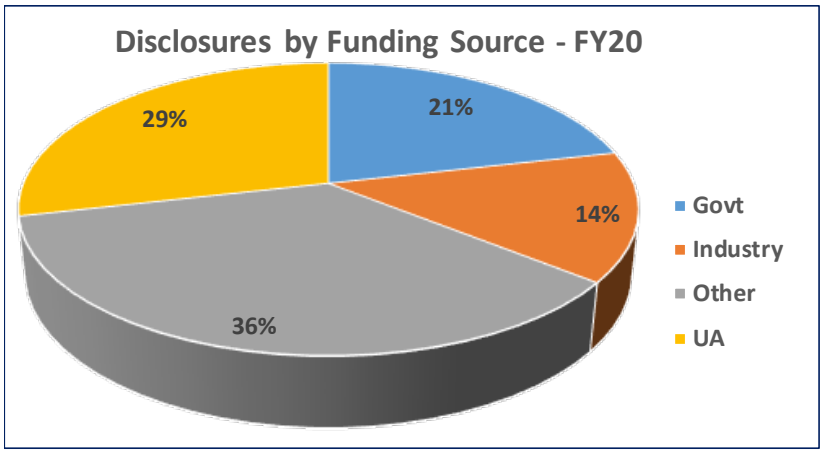
Cumulative Count of New Award Funding Received



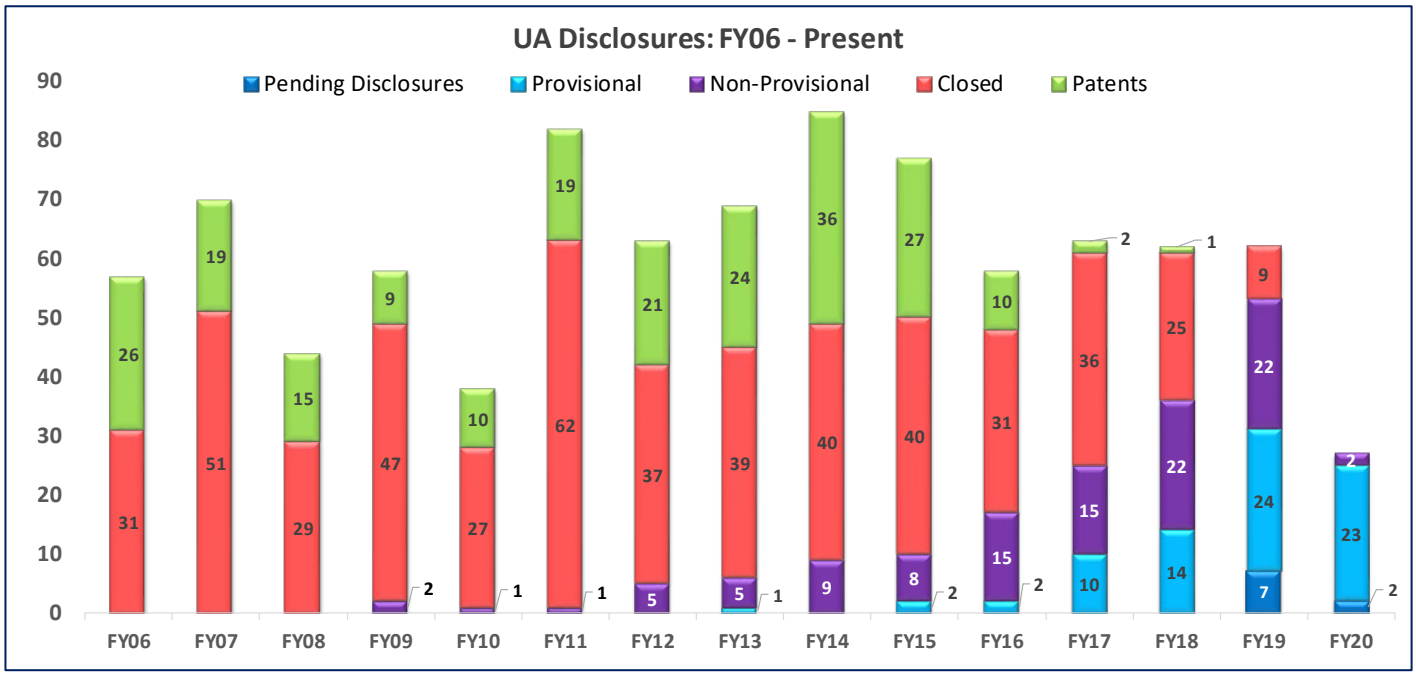
Technology Transfer: Invention Disclosures and Patent Activity FY06 to present

Disclosures submitted in FY20 to date continue in a variety of fields, with nearly 70% being in advanced materials and computers/data/ sensors/devices. All are being assessed regarding the technology and potential market, and all except four have been protected with a provisional patent. A provisional patent application protects an invention for one year. During this time a technology and market assessment is conducted to determine if a non-provisional patent should be filed. Once filed, it takes several years for the claims to be evaluated, revisions to be filed, and a patent to issue.





The funding source of research leading to inventions can affect the ability to commercialize the technology. Industry research agreements usually provide options for exclusive or non-exclusive licenses, with negotiated fees. Agreements often include provision for patent costs to be paid by the research sponsor. Government funding gives the university the right to patent and license, while including government use provisions. Other funding sources typically leave patent rights under university control and responsibility. Regardless of research funding, by Ohio statute any intellectual property created by State employees or by anyone using state funding or facilities is owned by UA.



U.S. Patents Issued from July 1, 2019 to February 29, 2020
(Sorted by Funding Source & Technology)

U.S. Patent	Issue Date	Patent Title	Inventors	College	Technology	Funding
10,336,896	7/2/2019	One-Pot Synthesis of Highly Mechanical and Recoverable Double-Network Hydrogels	Jie Zheng, Qiang Chen and Chao Zhao	COE	Advanced Materials	Govt
10,350,795	7/16/2019	Flexible and Electrically Conductive Polymer Films and Methods of Making Same	Mukerrem Cakmak	CPSPE	Advanced Materials	Govt
10,472,449	11/12/2019	Polybutadiene Graft Copolymers as Coupling Agents for Carbon Black and Silica Dispersion in Rubber Compounds	Sadhan Jana, Coleen Pugh, Prasad Raut and Hamad	CPSPE	Advanced Materials	Govt
10,344,304	7/9/2019	Materials Derived From Fermentation-Produced Rhamnolipids and Methods of Production	Lu-Kwang Ju and Shida Miao	COE	Biotechnology	Govt
10,570,924	2/25/2020	Integrated Motor Compressor for Vapor Compression Refrigeration System	Yilmaz Sozer, Jerald Cohen, Iftekhar Hasan and Tausif Husain	COE	Computers, Data, Sensors & Devices	Govt
10,414,864	9/17/2019	Degradable Amino Acid-Based Poly(ester urea) Copolymer Adhesives	Matthew Becker, Jinjun Zhou, Adrian Defante and Ali Dhinojwala	CPSPE	Medical	Govt
10,465,044	11/5/2019	Well-Defined Degradable Poly(Propylene Fumarate) Polymers and Scalable Methods for the Synthesis Thereof	Matthew Becker, David Dean and Yuanyuan Luo	CPSPE	Medical	Govt
10,538,636	1/21/2020	Room Temperature Polymer Crosslinking Using 1-Functionalized Benzocyclobutene	Coleen Pugh and Ajay Amrutkar	CPSPE	Polymer Science	Govt
10,428,355	10/1/2019	Production of Arabitol	Lu-Kwang Ju and Abdullah Loman	COE	Biotechnology	Industry
10,336,137	7/2/2019	Electrorheological Fluids Incorporated into Polymeric Articles and Tires	Shing-Chung (Josh) Wong	COE	Advanced Materials	Other
10,376,009	8/13/2019	Impact Protection and Shock Absorbing System and Method	Emily Kennedy, Daphne Fecheyr-Lippens, Bor-Kai Hsiung, Douglas Paige and Nathan Swift	BCAS	Computers, Data, Sensors & Devices	Other
10,386,249	8/20/2019	Wearable Inductive-Force Sensor	Jiang Zhe and Li Du	COE	Computers, Data, Sensors & Devices	Other
10,429,419	10/1/2019	System and Method for Iterative Condition Monitoring and Fault Diagnosis of Electric Machines	Seungdeog Choi	COE	Computers, Data, Sensors & Devices	Other
10,340,458	7/2/2019	Perovskite Hybrid Solar Cells	Xiong Gong, Chang Liu and Kai Wang	CPSPE	Energy	Other
10,335,490	7/2/2019	Fluorinated Polymerizable Hydrogels for Wound Dressings and Methods of Making Same	Nic Leipzig and Asanka Wijekoon	COE	Medical	Other

U.S. Patent	Issue Date	Patent Title	Inventors	College	Technology	Funding
10,368,886	8/6/2019	Surgical Apparatus With Force Sensor for Extraction of Substances Within the Body	Ajay Mahajan and Zahra Najafi	COE	Medical	Other