

FCR 19

Office of the President
December 15, 2020

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period July 1, 2020 to September 30, 2020.

Background: At its March 1997 meeting, the Board of Trustees authorized the University of Kentucky Research Foundation to conduct all future copyright and patent filings and prosecutions. Quarterly reports on patent and copyright applications are to be submitted to the Finance Committee of the Board.

Action taken: Approved Disapproved Other_____

PATENT ASSIGNMENTS
FOR THE PERIOD July 1, 2020 TO September 30, 2020

Patents

The following assignments on behalf of the Board of Trustees of the University of Kentucky Research Foundation have been executed:

- 1. U.S. Patent Application Serial Number:** 16/923,434
UKRFID: 2333
Filed: July 8, 2020
Title: SYNTHESIS AND FORMULATION OF LIGNIN DERIVED COMPOUNDS AS TREATMENT OF PLANT DISEASES
Inventors: Jian Shi and Ryan Kalinoski (College of Engineering)
Description and Application: The invention is a method of producing antimicrobial agents from lignin for use against plant and crop pathogens. The lignin is thermo-chemically treated to depolymerize the structure into a liquid oil, then the active lignin-derived components are enriched into fractions. The lignin can be sourced as a waste product from a variety of industries, such as biofuel, paper and pulp industries. This method is particularly useful against resistant plant pathogens such as *xanthomonas euvesicatoria* strains that cause bacterial spots on tomato crops and are resistant to copper-based pesticides and affect yields across the United States. The global antibacterial market in agriculture is projected to reach \$11.9 billion by 2022 at a compound annual growth rate (CAGR) of 4.6% during the forecast period.
License: N/A
- 2. U.S. Patent Application Serial Number:** 16/963,759
UKRFID: 2199
Filed: July 21, 2020
Title: SEMISYNTHETIC AURONES AND METHODS OF USE THEREOF
Inventors: David Watt, Chunming Liu, Jessica Blackburn, Yanqi Xie (College of Medicine), and Mykhaylo Frasinuk (formerly College of Medicine, National Academy of Sciences, Ukraine)
Description and Application: The invention is novel semisynthetic aurones for anti-cancer activity. These semisynthetic aurones inhibit cancer cell growth, e.g., leukemias, colon, prostate, breast and lung cancers. Aurones comprise a relatively small group of plant-derived flavonoids that arise out of a mixed polyketide-shikimate pathway and possess a range of biological properties. Targeted cancer therapeutics are under intense investigation for widespread applications, with a global market that is expected to grow at a CAGR of 4.7% to reach \$138.9 billion by 2021.
License: Exclusive license with Epionc, Inc. for foreign rights.

- 3. U.S. Patent Application Serial Number:** 16/937,032
UKRFID: 2238
Filed: July 23, 2020
Title: SINGLE STAGE CLARIFIER AND MIXING ASSEMBLY
Inventors: Joshua Werner (College of Engineering)
Description and Application: The invention is an in-tank clarifier for separating solid-liquid mixtures. The invention utilizes an in-tank lamella clarifier that allows for solid-liquid separation to occur during counterflow operation, simplifying the separation process. The elimination of thickener or an additional separation tank reduces the cost associated with running a counterflow operation. Although exact market size is unavailable, there is significant potential for this technology as a variety of industrial processes require separating solids and liquids. Examples of these industries include leaching processes in mining and mixing processes in food production.
License: Executed option agreement with Lexmark.
- 4. U.S. Patent Application Serial Number:** 16/937,380
UKRFID: 2345
Filed: July 23, 2020
Title: METHODS FOR GENDER IDENTIFICATION AND CULTIVATION OF CANNABIS SEEDS
Inventors: David Hildebrand, Jia Tan and Robert Geneve (College of Agriculture, Food and Environment)
Description and Application: The invention is a method for biological sex identification and cultivation of *Cannabis* seeds. The biological sex identification is based on the presence or absence of Y-chromosome specific genes such as SCAR119 marker in a biological sample of dry *Cannabis* seeds. The identification of female plants is important as female plants are capable of flowering. The global cannabis market was valued at \$10.6 billion in 2018 and is projected to reach \$97.3 billion by the end of 2026, exhibiting a CAGR of 32.9%.
License: N/A
- 5. U.S. Patent Application Serial Number:** 16/983,329
UKRFID: 2302
Filed: August 3, 2020
Title: ARCHITECTURE FOR GENERATING PHYSICALLY UNCLONABLE FUNCTION RESPONSE
Inventors: Himanshu Thapliyal and Carson Labrado (College of Engineering)
Description and Application: The invention is a platform to harness the potential of energy harvesters to act as physically unclonable functions (PUFs). PUFs are a class of circuits that use the inherent variations in the device manufacturing process to create unique and unclonable identification. PUFs' ability to generate unclonable secret keys or pseudonyms have been shown to be an effective means of cybersecurity. The global market for cybersecurity was \$137.8 billion as of 2017 and is expected to increase at a CAGR of 11% until 2022.
License: N/A

- 6. U.S Patent Application Serial Number:** 16/990,802
UKRFID: 1860
Filed: August 11, 2020
Title: METHOD AND SYSTEM FOR TERPENE PRODUCTION PLATFORMS IN YEAST
Inventors: Joe Chappell (College of Pharmacy), Xun Zhuang (formerly College of Pharmacy), and Wu Shuiqin
Description and Application: The invention is a novel method for producing modified yeast. The resulting yeast can be used as a platform for terpene production. The method includes chemical mutagenesis to affect ergosterol dependent growth yeast. The global terpene market was \$510 million in 2017 and is expected to reach \$730 million by 2025.
License: Option agreement with Enepret Inc. in negotiations.
- 7. U.S. Patent Application Serial Number:** 16/993,212
UKRFID: 2352
Filed: August 13, 2020
Title: NOVEL COMBINATION OF CRIZOTINIB WITH CHLOROQUINE FOR INHIBITION OF DIVERSE LUNG TUMORS
Inventors: Vivek Rangnekar and Ravshan Burikhanov (College of Medicine)
Description and Application: The invention is a method for sensitizing chemotherapy resistant tumors using a synergistic drug combination of agents capable of increasing cell surface expression of GRP78 and agents capable of increasing soluble prostate apoptosis response 4 (Par-4). The invention involves treating the drug resistant cancer cell with an effective amount of an agent capable of increasing cell surface expression of GRP78, such as Crizotinib, and an agent capable of increasing soluble Par-4. The agent capable of increasing soluble Par-4 is selected from chloroquine, hydroxychloroquine, or combinations thereof. The global market for lung cancer is expected to reach \$36 billion by 2023 based on an average growth of 13.5% CAGR between 2017 and 2023.
License: N/A
- 8. U.S. Patent Application Serial Number:** 16/994,857
UKRFID: 2329
Filed: August 17, 2020
Title: SURGICAL SKILLS TRAINING MODEL
Inventors: Samuel Powdrill and DeShana Collett (College of Health Sciences)
Description and Application: The invention is artificial tissue that responds in a realistic manner comparable to human skin and muscle created by layering specific quantities of pigmented silicone gels in specific patterns over a mesh. The invention can be used in training students in wound closure, injections, drainage and incision procedures. The demand for medical simulations is significant and was estimated at \$1.3 billion in 2017 with an expected CAGR of 14.9%.
License: N/A

9. **U.S. Patent Application Serial Number:** 16/998,366
UKRFID: 2286
Filed: August 20, 2020
Title: INNOVATIVE MANUFACTURING METHODS FOR NEXT-GENERATION PRODUCTS, PROCESSES, AND SYSTEMS
Inventors: Ibrahim Jawahir (College of Engineering) and Ryan Bradley (formerly College of Engineering)
Description and Application: The invention is a method of manufacturing products according to a novel manufacturing methodology. The invention results in a redesign of product, process and system level by leveraging Internet of Things (IoT) and associated data management infrastructure to disseminate information through all levels of an associated supply chain. The global market for manufacturing logistics and consultants was \$17.1 billion in 2019 and is expected to increase at a CAGR of 5.3%.
License: N/A
10. **U.S. Patent Application Serial Number:** 16/975,846
UKRFID: 2241
Filed: August 26, 2020
Title: MULTIVALENT LIVE-ATTENUATED INFLUENZA VACCINE FOR PREVENTION AND CONTROL OF EQUINE INFLUENZA VIRUS (EIV) IN HORSES
Inventors: Thomas Chambers (College of Agriculture, Food and Environment), Luis Martinez-Sobrido (University of Rochester) and King Kendall (Zoetis LLC)
Description and Application: The invention is an immunological composition including at least two equine live-attenuated influenza viruses (LAIV). The first LAIV expresses one or more antigens of clade 1 H3N8 equine influenza and the second LAIV expressing one or more antigens of clade 2 H3N8 equine influenza virus. Thus, the novel vaccine represents an improvement over traditional equine influenza vaccines.
License: Option executed between University of Rochester and Zoetis LLC.
11. **U.S. Patent Application Serial Number:** 17/006,588
UKRFID: 2379
Filed: August 28, 2020
Title: DEVELOPMENT OF POLYLYSINE:EPIGALLOCATECHIN-3-O-GALLATE AND DSRNA POLYPLEXES FOR CONTROL OF MOSQUITOES
Inventors: Subba Palli and Ramesh Dhandapani (College of Agriculture, Food and Environment)
Description and Application: The invention is a method of controlling disease carrying insects through the use of a polyplex composition to modulate expression of a gene-of-interest in a target insect that includes a molecule for initiating RNA interference (RNAi). The polyplex compositions developed provide a safe, nontoxic and specific method of population control of *Aedes aegypti*, a mosquito that spreads dengue fever, Zika fever, yellow fever viruses and other disease agents. Mosquito control had a global market of \$290 million in 2018 with an expected CAGR of 3% until 2025.

License: A non-exclusive license is current being negotiated.

- 12. U.S Patent Application Serial Number:** 17/007,536
UKRFID: 1895
Filed: August 31, 2020
Title: METHOD OF SUPPLEMENTING THE DIET AND AMELIORATING OXIDATIVE STRESS
Inventors: Boyd Haley (College of Arts and Sciences) and Nialdri Gupta
Description and Application: The invention is a novel dietary supplement to remove heavy metals and other toxins while ameliorating oxidative stress. The novel supplement is a single molecule with cell membrane penetrating properties, metal chelation and oxygen radical scavenging properties, and non-toxic characteristics. The global market for dietary supplements is \$123 billion and is expected to grow at a CAGR of 8.2%.
License: Exclusively licensed to EmeraMed Inc. (formerly Chelator Technologies Inc.).
- 13. U.S. Patent Application Serial Number:** 17/014,164
UKRFID: 2384
Filed: September 8, 2020
Title: AIR PREHEATER AND METHOD OF DECOMPOSING AND REMOVING AMMONIUM BISULFATE FROM A REGENERATIVE HEATING ELEMENT OF THAT AIR PREHEATER
Inventors: Kunlei Liu, Heather Nikolic (Center for Applied Energy Research) and Chenggua Ma
Description and Application: The invention is a novel air preheater designed to eliminate ash fouling and increasing a power plant's capacity. The novel air preheater allows for in-situ destruction of ammonium bisulfate and loosening of fouled ash eliminating the need for forced outages. Unlike other solutions, this novel preheater would not require a significant hardware retrofit and can be installed on existing air preheaters. Coal fired power plants make up approximately 40% of global energy generation. The market for coal fired power plants was \$98 billion with a projected five-year CAGR of 3.1%.
License: N/A
- 14. International Application Number:** PCT/US20/40604
UKRFID: 2375
Filed: July 2, 2020
Title: BONE BIOPSY SYSTEM AND METHOD
Inventors: Rao Madhumathi, Clay Larkin and Florence Lima (College of Medicine)
Description and Application: The invention is a novel bone biopsy needle designed for sampling bone with minimal damage to microarchitecture and surrounding tissue. The novel needle is used in conjunction with a power tool to minimize the force required during the procedure. The global osteoporosis diagnostic market is approximately \$455 million with an expected CAGR of 4.1%.
License: N/A

- 15. International Application Number:** PCT/US20/48582
UKRFID: 2310
Filed: August 28, 2020
Title: COLLAGEN P4H1 INHIBITOR AND ITS USE
Inventors: Ren Xu and Shike Wang (College of Medicine)
Description and Application: The invention is a novel high-throughput assay method to measure C-P4H1 activity in vitro. The novel assay can be used to identify C-P4H1 inhibitors and activators. The novel assay is faster than currently available screening methods. The global market for cell assay kits was \$3.6 billion in 2016 and expected to reach \$10.6 billion by 2023.
License: N/A
- 16. International Application Number:** PCT/US20/48847
UKRFID: 2172
Filed: August 31, 2020
Title: METHOD AND SYSTEM FOR SCREENING AND SELECTIVELY HARVESTING PRODUCTS FROM PLANT OR ALGAL CELLS IN CULTURE
Inventors: John Littleton, Jan Smalle, Jasmine Kurepa (College of Agriculture, Food and Environment), Barbara Knutson, Stephen Rankin (College of Engineering) and Luke Bradley (College of Medicine)
Description and Application: The invention is a method for screening for and isolating a target product from a plant or algal cell culture without the need to destroy the plant or algal cell. The invention adds functionalized nanoparticles to a culture medium. The functionalized nanoparticles enter the plant or algal cell and bind to the product-of-interest and are extruded into the culture medium. The product-of-interest can then be separated from the extruded nanoparticles. The antineoplastic agent harvesting global market was \$4.6 billion in 2017 and expected to reach \$5.4 billion by 2025.
License: N/A
- 17. International Application Number:** PCT/US20/48852
UKRFID: 2321
Filed: August 31, 2020
Title: N-ARYL ARYLSULFONAMIDES THAT FUNCTION AS MITROCHONDRIAL UNCOUPLERS FOR THE TREATMENT OF METABOLIC DISEASE AND CANCER
Inventors: Chuming Liu, David Watt, Wen Zhang, Brett Spear, Francesc Marti, Roberto Gedaly (College of Medicine) and Yang Yang-Hartwich (Yale University)
Description and Application: The invention includes novel *N*-aryl arylsulfonamides and methods for proton uncoupling as a treatment for cancer. Specifically, the *N*-aryl arylsulfonamides are eukaryotic proton uncouplers and may be used to target the micro-environment of a tumor and reduce or eliminate cell proliferation and progression. The global market for liver cancer treatment was \$513 million in 2017 and is expected to grow to \$2.1 billion in 2025.
License: N/A

- 18. Foreign Application:** IN202017027982
UKRFID: 2183
Filed: July 1, 2020
Title: bZIP TRANSCRIPTION FACTORS REGULATE CONVERSION OF NICOTINE TO NORNICOTINE
Inventors: Ling Yuan, Sanjay Singh, Sitakanta Pattanaik (College of Agriculture, Food and Environment) and Darlene Lawson (R.J. Reynolds Tobacco Company)
Description and Application: The invention is a method of decreasing conversion of nicotine to nornicotine. Nornicotine is a precursor to *N*-nitrosonornicotine (NNN), which is produced during the curing and processing of tobaccos materials. Specifically, during post-harvest processing, nornicotine chemically reacts with nitrosating agents to form NNN. As NNNs belong to a class of smoking related carcinogens called tobacco specific nitrosamines (TSNA), it is highly desirable to reduce TSNA in tobacco products. The method involves administering a basic region/leucine zipper (bZIP) type transcription factor inhibitor to an organism. The invention also provides a method for mutating a bZIP type transcription factor binding site on a promoter of a nicotine N-demethylase (NND). In other methods, the plant genome may be mutated to knockout at least one bZIP type transcription factor. The global tobacco market is expected to reach \$1.1 trillion by 2027 with an expected growth of 3.1%.
License: N/A – Technology jointly owned with R.J. Reynolds Tobacco Company.
- 19. Foreign Application:** EPO197108890.5
UKRFID: 2241
Filed: July 22, 2020
Title: MULTIVALENT LIVE-ATTENUATED INFLUENZA VACCINE FOR PREVENTION AND CONTROL OF EQUINE INFLUENZA VIRUS (EIV) IN HORSES
Inventors: Thomas Chambers (College of Agriculture, Food and Environment), Luis Martinez-Sobrido (University of Rochester) and King Kendall (Zoetis LLC)
Description and Application: The invention is an immunological composition including at least two equine live-attenuated influenza viruses (LAIV). The first LAIV expresses one or more antigens of clade 1 H3N8 equine influenza and the second LAIV expresses one or more antigens of clade 2 H3N8 equine influenza virus. Thus, the novel vaccine represents an improvement over traditional equine influenza vaccines.
License: Option executed between University of Rochester and Zoetis LLC.
- 20. Foreign Application:** CN2019800140455
UKRFID: 2241
Filed: August 18, 2020
Title: MULTIVALENT LIVE-ATTENUATED INFLUENZA VACCINE FOR PREVENTION AND CONTROL OF EQUINE INFLUENZA VIRUS (EIV) IN HORSES
Inventors: Thomas Chambers (College of Agriculture, Food and Environment), Luis Martinez-Sobrido (University of Rochester) and King Kendall (Zoetis LLC)

Description and Application: The invention is an immunological composition including at least two equine live-attenuated influenza viruses (LAIV). The first LAIV expresses one or more antigens of clade 1 H3N8 equine influenza and the second LAIV expresses one or more antigens of clade 2 H3N8 equine influenza virus. Thus, the novel vaccine represents an improvement over traditional equine influenza vaccines.

License: Option executed between University of Rochester and Zoetis LLC.

21. Foreign Application: BR 11 2020 017354 1

UKRFID: 2241

Filed: August 25, 2020

Title: MULTIVALENT LIVE-ATTENUATED INFLUENZA VACCINE FOR PREVENTION AND CONTROL OF EQUINE INFLUENZA VIRUS (EIV) IN HORSES

Inventors: Thomas Chambers (College of Agriculture, Food and Environment), Luis Martinez-Sobrido (University of Rochester) and King Kendall (Zoetis LLC)

Description and Application: The invention is an immunological composition including at least two equine live-attenuated influenza viruses (LAIV). The first LAIV expresses one or more antigens of clade 1 H3N8 equine influenza and the second LAIV expresses one or more antigens of clade 2 H3N8 equine influenza virus. Thus, the novel vaccine represents an improvement over traditional equine influenza vaccines.

License: Option executed between University of Rochester and Zoetis LLC.

22. Foreign Application: MX/A/2020/008927

UKRFID: 2241

Filed: August 26, 2020

Title: MULTIVALENT LIVE-ATTENUATED INFLUENZA VACCINE FOR PREVENTION AND CONTROL OF EQUINE INFLUENZA VIRUS (EIV) IN HORSES

Inventors: Thomas Chambers (College of Agriculture, Food and Environment), Luis Martinez-Sobrido (University of Rochester) and King Kendall (Zoetis LLC)

Description and Application: The invention is an immunological composition including at least two equine live-attenuated influenza viruses (LAIV). The first LAIV expresses one or more antigens of clade 1 H3N8 equine influenza and the second LAIV expresses one or more antigens of clade 2 H3N8 equine influenza virus. Thus, the novel vaccine represents an improvement over traditional equine influenza vaccines.

License: Option executed between University of Rochester and Zoetis LLC.

Patent Activities

Fiscal year to date as of September 30, 2020

Total FY2020-21					
	FY21Q1	FY21Q2	FY21Q3	FY21Q4	Total FY20
Full Patent Applications	22	0	0	0	22
Provisional Patent Applications	26	0	0	0	26
Patents Issued	8	0	0	0	8
License Income	\$810,900.86	\$0	\$0	\$0	\$810,900.86 ¹
Total FY2019-20					
	FY20Q1	FY20Q2	FY20Q3	FY20Q4	Total FY19
Full Patent Applications	11	16	13	21	61
Provisional Patent Applications	28	14	25	32	99
Patents Issued	7	11	7	8	33
License Income	\$1,365,221.64	\$66,754.90	\$1,478,971.84	\$32,673.12	\$2,943,621.50

¹ Financial data retrieved October 12, 2020.

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
Biomedical			
David Watt, Chunming Liu, Jessica Blackburn, Yanqi Xie, Mykhaylo Frasinyuk	Medicine	Semisynthetic auronones and methods of use thereof	Novel semisynthetic auronones for anti-cancer activity.
Joe Chappell, Xun Zhuang, Wu Shuiqin	Pharmacy	Method and system for terpene production platforms in yeast	A novel method for producing modified yeast. The resulting yeast can be used as a platform for terpene production.
Vivek Rangnekar, Ravshan Burikhanov	Medicine	Novel combination of crizotinib with chloroquine for inhibition of diverse lung tumors	A method for sensitizing chemotherapy resistant tumors using agents capable of increasing cell surface expression of GRP78 and agents capable of increasing soluble prostate apoptosis response 4 (Par-4).
Rao Madhumathi, Clay Larkin, Florence Lima	Medicine	Bone biopsy system and method	A novel bone biopsy needle designed for sampling bone with minimal damage to microarchitecture and surrounding tissue.
Ren Xu, Shike Wang	Medicine	Collagen P4H1 inhibitor and its use	A novel high-throughput assay method to measure C- P4H1 activity in vitro.
Chuming Liu, David Watt, Wen Zhang, Brett Spear, Francesc Marti, Roberto Gedaly, Yang Yang-Hartwich	Medicine	N-aryl arylsulfonamides that function as mitochondrial uncouplers for the treatment of metabolic disease and cancer	Novel <i>N</i> -aryl arylsulfonamides and methods for proton uncoupling as a treatment for cancer.

Engineering			
Jian Shi, Ryan Kalinoski	Engineering	Synthesis and formulation of lignin derived compounds as treatment of plant diseases	A method of producing antimicrobial agents from lignin for use against plant and crop pathogens.
Joshua Werner	Engineering	Single state clarifier and mixing assembly	An in-tank clarifier for separating solid-liquid mixtures utilizing an in-tank lamella clarifier.
Himanshu Thapliyal, Carson Labrado	Engineering	Architecture for generating physically unclonable function response	A platform to harness the potential of energy harvesters to act as physically unclonable functions (PUFs) for cybersecurity.
Ibrahim Jawahir, Ryan Bradley	Engineering	Innovative manufacturing methods for next-generation products, processes and systems	A novel method of manufacturing products according to a novel manufacturing methodology leveraging Internet of Things.
Kunlei Liu, Heather Nikolic, Chenggua Ma	CAER	Air preheater and method of decomposing and removing ammonium bisulfate from a regenerative heating element of that air preheater	A novel air preheater designed to eliminate ash fouling and increasing a power plant's capacity.
Agriculture, Food and Environment			
David Hildebrand, Jia Tan, Robert Geneve	Agriculture, Food and Environment	Methods for gender identification and cultivation of cannabis seeds	A method for gender identification and cultivation of <i>Cannabis</i> seeds based on the presence or absence of Y-chromosome specific genes.
Thomas Chambers, Luis Martinez-Sobrido, King Kendall	Agriculture, Food and Environment	Multivalent live-attenuated influenza vaccine for prevention and control of equine influenza virus (EIV) in horses	A novel vaccine for equine influenza virus.
Subba R. Palli, Ramesh Dhadapani	Agriculture, Food and Environment	Development of POLYLYSINE:EPIGALLOCATEC HIN-3-O-GALLATE and DSRNA for control of mosquitoes	A method of controlling disease carrying insects through the use of a polyplex composition for modulating expression of a gene-of-interest in a target insect.
John Littleton, Jan Smalle, Jasmine Kurepa,	Agriculture, Food and Environment,	Method and system for screening and selectively harvesting	A method for screening for and isolating a target product from a plant or algal cell culture without destroying the plant or algal cell.

Barbara Knutson, Stephen Rankin, Luke Bradley	Engineering, Medicine	products from plant or algal cells in culture	
Ling Yuan, Sanjay Singh, Sitakanta Pattanaik, Darlene Lawson	Agriculture, Food and Environment	bZIP transcription factors regulate conversion of nicotine to nornicotine	A method of decreasing conversion of nicotine to nornicotine through a variety of methods.
Thomas Chambers, Luis Martinez-Sobrido, King Kendall	Agriculture, Food and Environment	Multivalent live-attenuated influenza vaccine for prevention and control of equine influenza virus (EIV) in horses	A novel vaccine for equine influenza virus.
Thomas Chambers, Luis Martinez-Sobrido, King Kendall	Agriculture, Food and Environment	Multivalent live-attenuated influenza vaccine for prevention and control of equine influenza virus (EIV) in horses	A novel vaccine for equine influenza virus.
Thomas Chambers, Luis Martinez-Sobrido, King Kendall	Agriculture, Food and Environment	Multivalent live-attenuated influenza vaccine for prevention and control of equine influenza virus (EIV) in horses	A novel vaccine for equine influenza virus.
Thomas Chambers, Luis Martinez-Sobrido, King Kendall	Agriculture, Food and Environment	Multivalent live-attenuated influenza vaccine for prevention and control of equine influenza virus (EIV) in horses	A novel vaccine for equine influenza virus.
Arts and Sciences			
Boyd Haley, Nialdri Gupta	Arts and Sciences	Method of supplementing the diet and ameliorating oxidative stress	A novel dietary supplement to remove heavy metals and other toxins while ameliorating oxidative stress.

Health Sciences

Samuel Powdrill,
DeShana Collett

Health
Sciences

Surgical skills training model

Artificial tissue that respond in a realistic manner comparable to human skin and muscle created by layering silicone gels.