

FCR 10

Office of the President
September 11, 2020

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period April 1, 2020 to June 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 April 1, 2020 to June 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:** 16/843,435
UKRFID: 2339
Filed: April 8, 2020
Title: PRODUCTION OF FUEL PELLETS
Inventors: Thomas Keene (College of Agriculture, Food and Environment) and Darrell Taulbee (Center for Applied Energy Research)
Description and Application: The invention is a process for forming fuel pellets by compressing a hemp byproduct waste blended with either high-moisture sawdust or a mixture of high-moisture sawdust and coal fines. Fuel pellets produced in this manner avoid potential landfill costs for the sawdust and hemp byproduct, but importantly it allows sawdust to be transported and utilized in coal-fired utility boilers using existing infrastructure. Although at the time of disclosure there is limited market for hemp byproduct, this area is poised for growth. The use of fuel pellets could save landfill costs of between \$40 to \$45/ton for hemp waste and green sawdust. The contemplated facility will be able to process 300 to 350 tons per year of waste. With the 6,700 acres of hemp cultivation permitted for Kentucky in 2018 this market will only continue to increase.
License: Exclusive option with South Central Leaf Services, LLC in negotiations.
- 2. U.S. Patent Application Serial Number:** 16/843,542
UKRFID: 2334
Filed: April 8, 2020
Title: A MOTION FEEDBACK DEVICE
Inventors: Matthew Ruffner, Kevin Donohue (College of Engineering) and Michael Sikora (formerly College of Engineering)
Description and Application: The invention is a programmable electronic device that functions as an interface for creating sound through motion with special feedback and guidance. The device a vibration motor, accelerometer, wireless connection, and an onboard speaker. The device can be used as a musical instrument, music creation and collaboration, and music therapy. The device is accessible to disabled individuals. The device may also be used instructionally for imitating motion such as swinging a racket or club, and basic motion such as walking for use in rehabilitation. An estimated 1.5 million individuals are receiving music therapy.
License: N/A

- 3. U.S. Patent Application Serial Number:** 16/845,235
UKRFID: 2317
Filed: April 10, 2020
Title: METHOD FOR MANUFACTURING PEROVSKITE-BASED DEVICES IN AMBIENT AIR
Inventors: Zhi Chen (College of Engineering) and Feng Wang (Visiting Scholar, College of Engineering)
Description and Application: The invention is a monitoring system for producing perovskite solar cells (PSC) in ambient temperatures. The invention monitors the point in time at which a perovskite film turns from transparent to turbid, thus enabling the production of PSCs at ambient temperature. PSCs have been found to be a very efficient class of solar cells, with lab-scale PSCs demonstrating power conversion efficiencies up to 23%. The ability to produce PSC in ambient air would greatly reduce the cost of manufacturing. The global market for thin film solar cells is estimated at \$11.9 billion with an expected growth of 19.4% compound annual growth rate (CAGR) until 2023.
License: N/A
- 4. U.S. Patent Application Serial Number:** 16/846,989
UKRFID: 2115
Filed: April 13, 2020
Title: VESICULAR MONOAMINE TRANSPORTER-2 LIGANDS AND THEIR USE IN THE TREATMENT OF PSYCHOSTIMULANT ABUSE
Inventors: Linda Dwoskin and Zheng Cao (College of Pharmacy), Justin Nickell, Na-Ra Lee, Peter Crooks (formerly College of Pharmacy) and Guangrong Zheng (formerly College of Pharmacy)
Description and Application: The invention is a treatment for substance abuse disorder, drug dependence or abuse, and withdrawal therefrom that includes administering *N*-phenylalkyl amphetamine and pharmaceutical compositions containing these compounds. Specifically, the inventive small molecules are adept in the treatment of methamphetamine (meth) addiction. Currently it is estimated that there are 15 million to 16 million meth users worldwide. With no current FDA-approved therapeutics, the current treatment of meth use disorder is behavioral therapy.
License: N/A
- 5. U.S. Patent Application Serial Number:** 16/848,462
UKRFID: 2115
Filed: April 14, 2020
Title: VESICULAR MONOAMINE TRANSPORTER-2 LIGANDS AND THEIR USE IN THE TREATMENT OF PSYCHOSTIMULANT ABUSE
Inventors: Linda Dwoskin, Jon Thorson, Markos Leggas, Rodney Kiplin Guy, Jared Hammill, Derong Ding (College of Pharmacy), David Watt, Stefan Kwiatkowski (College of Medicine), Na-Ra Lee, Peter Crooks, and Guangrong Zheng (formerly College of Pharmacy)

Description and Application: The invention is a treatment for substance abuse disorder, drug dependence or abuse, and withdrawal therefrom that includes administering *N*-phenylalkyl amphetamine and pharmaceutical compositions containing these compounds. Specifically, the inventive small molecules are adept in the treatment of methamphetamine (meth) addiction. Currently it is estimated that there are 15 million to 16 million meth users worldwide. With no current FDA-approved therapeutics, the current treatment of meth use disorder is behavioral therapy.

License: N/A

6. U.S. Patent Application Serial Number: 16/851,986

UKRFID: 2294

Filed: April 17, 2020

Title: MODIFIED-RNA NANOPARTICLES FOR INDUCTION OF RNA INTERFERENCE

Inventors: Subba R. Palli and Ramesh Dhadapani (College of Agriculture, Food and Environment)

Description and Application: The invention is an improved chitosan (CS) nanoparticle using sodium tripolyphosphate (TPP) to create CS-TPP-double stranded ribonucleic acid (dsRNA) to silence genes in the yellow fever mosquito. The current market for mosquito mitigation chemicals is approximately \$11.3 billion and is expected to rise to \$13.7 billion by 2023.

License: N/A

7. U.S. Patent Application Serial Number: 16/856,533

UKRFID: 2350

Filed: April 23, 2020

Title: TESTBED DEVICE FOR USE IN PREDICTIVE MODELING OF MANUFACTURING PROCESSES

Inventors: Julius Schoop (College of Engineering)

Description and Application: The invention is a testbed device that includes high-performance actuators, video microscopy system and a plurality of high-resolution, throughput sensors configured for collecting data for use in predictive modeling of machine processes. This invention would improve machining capabilities for complex aerospace components that require high tolerances. The machining market is currently approximately \$341.91 billion globally and is expected to grow at a rate of 6% until 2022. The precision machining market holds a market size of 70% and is expected to increase.

License: N/A

8. U.S. Patent Application Serial Number: 16/861,036

UKRFID: 2150

Filed: April 28, 2020

Title: ENDOLUMINAL GRAFT SYSTEM AND METHOD OF IMPLANTING THE SAME

Inventors: David Minion (College of Medicine)

Description and Application: The invention is an endoluminal graft system and method of implantation in the treatment of aneurysms. The inventive graft system

provides the formation of scallops in-situ during the delivery and deployment of the endoluminal graft. This ensures proper alignment of the scallop with the branching vasculature and eliminating the need for custom manufacturing of grafts with preformed scallops. The aneurysm repair market is currently approximately \$2.3 billion and is expected to rise to \$3.5 billion by 2023, with a growth rate of 6.2%.

License: N/A

9. U.S. Patent Application Serial Number: 16/870,625

UKRFID: 2374

Filed: May 8, 2020

Title: 5-LOX AND COX-2 INHIBITION FOR TREATMENT IN CONNECTION WITH BLOOD-BRAIN BARRIER DYSFUNCTION

Inventors: Bjoern Bauer, Brent Sokola (College of Pharmacy), and Anika Hartz (College of Medicine)

Description and Application: The invention is a novel epilepsy therapy using a combination of 5-lipoxygenase (5-LOX) and cyclooxygenase-2 (COX-2) inhibitors. This combination 5LOX/COX-2 therapy targets blood-brain barrier (BBB) dysfunction and neuroinflammation that are not addressed in currently prescribed antiepileptic drugs such as gabapentin and carbamazepine. The global epilepsy treatment market has a current value of approximately \$4.65 billion and is expected to grow at a rate of 4.2% annually. This combination drug therapy may also be used to treat BBB dysfunction in other conditions that induce seizures such as strokes. The global market for stroke diagnostics and therapeutics is currently approximately \$23 billion with an expected growth of 7.3% annually.

License: N/A

10. U.S. Patent Application Serial Number: 16/875,169

UKRFID: 2299

Filed: May 15, 2020

Title: APPARATUS TO REMOVE HARMFUL CHEMICAL SPECIES FROM INDUSTRIAL WASTEWATER USING IRON-BASED PRODUCTS

Inventors: Kunlei Liu, Xin Gao, Ayokunle Omosebi, James Landon, Jesse Thompson, Keemia Abad, and Zilong Ma (Center for Applied Energy Research)

Description and Application: The invention is a one-step process for removing harmful contaminants from wet flue gas desulfurization (WFGD) wastewater. The process uses an electrochemical method to form a product called green rust (GR). GR can be easily formed by passing enough current through the wastewater, causing the iron present in the wastewater to bind the contaminants. GR can be easily filtered out of the wastewater, removing the contaminants. This one-step process requires a much smaller building footprint while reducing the need for any chemical or biological reagents. This system can also be used to remove heavy metal contaminants from any wastewater, regardless of source. The market for flue gas treatment systems is approximately \$53.3 billion with an expected growth rate of 5.3% annually.

License: N/A

- 11. International Application Number:** 16/882,052
UKRFID: 2376
Filed: May 22, 2020
Title: UNIQUE REDOX-ACTIVE PHENOTHIAZINE COMBINATIONS WITH DEPRESSED MELTING POINTS FOR INCREASED SOLUBILITY AND METHOD OF USE IN ENERGY STORAGE AND IN REDOX FLOW BATTERIES
Inventors: Susan Odom (College of Arts and Sciences) and Giorgio Baggi (formerly College of Art and Sciences)
Description and Application: The invention is a combination of phenothiazine derivatives to depress melting points and increase solubility to allow for higher concentrations of redox active compounds in a flow battery. The higher concentrations of redox active compounds within the flow battery increases the power storage ability as compared to other flow battery technologies. The flow battery market is approximately \$230 million with an exponential growth rate of 32.7% expected annually. The energy storage market is expected to receive \$620 billion in new investments by 2040.
License: N/A
- 12. U.S. Patent Application Serial Number:** 16/883,724
UKRFID: 2336
Filed: May 26, 2020
Title: BUTYRYLCHOLINESTERASE INHIBITORS FOR TREATMENT OF OPIOID USE DISORDER
Inventors: Chang-Guo Zhan and Fang Zheng (College of Pharmacy)
Description and Application: The invention is a treatment for heroin abuse using ethopropazine (an FDA-approved antiparkinsonian drug). Ethopropazine prevents the conversion of heroin to biologically active morphine through the inhibition of butyrylcholinesterase (BChe), which hydrolyzes heroin into 6-monoacetylmorphine (6-MAM). By interfering with heroin metabolism, ethopropazine can protect against future overdose among patients receiving naltrexone therapy. Heroin use in the United States increased 135% from 2002 to 2016. The opioid addiction treatment market is approximately \$23 billion and is expected increase 4.8% annually.
License: N/A
- 13. U.S Patent Application Serial Number:** 16/885,369
UKRFID: 2515
Filed: May 28, 2020
Title: DEVICES AND METHODS FOR REMOVING PERFLUORINATED COMPOUNDS FROM CONTAMINATED WATER
Inventors: Dibakar Bhattacharyaa, Lindell Ormsbee, Rollie Mills (College of Engineering), Mohammed Mottaleb (College of Medicine) and Anthony Saad (formerly College of Engineering)
Description and Application: The invention is a device and method for removing perfluorinated compounds (PFCs) from PFC-contaminated water. Due to their thermal stability, highly fluorinated compounds have been used since the 1960s for a variety of purposes. This has resulted in increased perfluorinated contamination that the Environmental Protection Agency (EPA) has labeled as an emerging technology. The inventive technology uses temperature responsive

hydrogels to remove the PFCs from contaminated water. The PFCs can then be removed from the hydrogel and the hydrogel regenerated to reabsorb PFCs. The global water absorbent market size is an estimated \$459 million and is expected to expand at 4% annually.

License: N/A

14. U.S Patent Application Serial Number: PCT/US20/27623

UKRFID: 2354

Filed: April 10, 2020

Title: MODIFIED PROSTATE APOPTOSIS RESPONSE-4 (PAR-4) POLYPEPTIDE, AND METHODS OF PRODUCTION AND USE

Inventors: Chan-Guo Zhan, Fang Zheng, Kyungbo Kim (College of Pharmacy) and Vivek Rangnekar (College of Medicine)

Description and Application: The invention is a modified form of the prostate apoptosis response-4 protein (Par-4), which promotes cell death in cancer cells, but not healthy cells. By modifying the original Par-4 peptide, the novel modification (Par-4EX) has a half-life that is approximately seven times longer than Par-4. This allows for greater potency and in vivo efficiency in a mouse model of metastatic breast cancer. The total global oncology market is valued at \$122 billion with an expected 10% growth annually. The breast and pancreatic cancer have global markets of \$16.2 billion and \$2 billion respectively.

License: N/A

15. U.S Patent Application Serial Number: 16/889,198

UKRFID: 2362

Filed: June 1, 2020

Title: METHOD OF TREATING STIMULANT USE DISORDER USING A COMBINATION OF TOPIRAMATE AND PHENTERMINE

Inventors: Craig Rush (College of Medicine)

Description and Application: The invention is new therapy for cocaine use disorder. The novel treatment involves administering a drug combination of topiramate and phentermine. A topiramate-phentermine combination, marketed as Qsymia®, is indicated for obesity, but research has discovered that this combination resulted in a 70% reduction in cocaine self-administration. The substance use market is approximately \$4 billion with an expected growth rate of 12.4% until 2024.

License: N/A

16. U.S Patent Application Serial Number: 16/769,750

UKRFID: 2215

Filed: June 4, 2020

Title: COMPOSITIONS AND METHODS FOR ENHANCING NEURO-REPAIR

Inventors: Gregory Bix (formerly College of Medicine)

Description and Application: The invention is a method for enhancing recovery after an ischemic injury, including cerebral ischemia and stroke, by the administration of therapeutic amounts of a domain V protein, perlecan. Perlecan is an extracellular matrix proteoglycan that has been implicated in developmental neurogenesis. Inventors have demonstrated that domain V of perlecan is

neuroprotective and can restore function following an experimental stroke. Importantly, administering perlecan domain V expands the therapeutic window up to 7 days. The global market for stroke diagnostics and therapeutics is currently approximately \$23 billion with an expected growth of 7.3% annually.

License: Exclusive license with Stream Biomedical Inc. in negotiations

17. U.S Patent Application Serial Number: PCT/US20/36426

UKRFID: 2183

Filed: June 5, 2020

Title: BZIP TRANSCRIPTION FACTORS REGULATE CONVERSION OF NICOTINE TO NORNICOTINE AND REDUCE LEVELS OF TOBACCO SPECIFIC (TSNA) PRECURSORS

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. The method involves administering a basic region/leucine zipper (bZIP) type transcription factor inhibitor to an organism. The method also provides 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 \$1.08 trillion by 2027 with an expected growth of 3.1%.

License: N/A – Technology jointly owned with R.J. Reynolds Tobacco Company

18. U.S Patent Application Serial Number: 16/770,906

UKRFID: 2183

Filed: June 8, 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. The method involves the administering a basic region/leucine zipper (bZIP) type transcription factor inhibitor to an organism. The method also provides 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 \$1.08 trillion by 2027 with an expected growth of 3.1%.

License: N/A – Technology jointly owned with R.J. Reynolds Tobacco Company

19. U.S Patent Application Serial Number: 16/895,985

UKRFID: 2381

Filed: June 8, 2020

Title: ANTIMICROBIAL COMPOUNDS, COMPOSITIONS, AND METHODS

Inventors: Sylvie Garneau-Tsodikova (College of Pharmacy) and Octavio Gonzalez (College of Medicine)

Description and Application: The invention is a novel zafirlukast derivative that can be used as an antimicrobial agent to target *P. gingivalis* with greater specificity and decreased cytotoxicity compared to the parent zafirlukast. *P. gingivalis* is a major oral pathogen involved in periodontal disease, which affects nearly half of the adult population. The novel zafirlukast derivative better maintains the oral microbiome than traditional treatments. The combined global markets for oral care, toothpaste, and mouthwash are approximately \$54 billion with an average growth rate of 5.5% annually.

License: N/A

20. U.S Patent Application Serial Number: 16/901,393

UKRFID: 2262

Filed: June 15, 2020

Title: CROSS-GAP-NANOPORE HETEROSTRUCTURE DEVICE AND METHOD FOR IDENTIFYING CHEMICAL SUBSTANCE

Inventors: Douglas Strachan (College of Arts and Sciences)

Description and Application: The invention is a technology that enables the placement of multiple electrodes in the same nanopore. The electrodes terminate at the edge of the of the nanopore allowing unimpeded flow of fluids and other substrates through the nanopore. Nanopores have numerous applications, particularly in sensing biological or chemical species. Notably, nanopores are used in the sequencing of deoxyribonucleic acid (DNA). This invention could also be used in manufacturing of membrane filtration systems. The combined global markets for DNA sequencing, nanomaterials, and membrane filtration is approximately \$23 billion, with expected growth of 11% to 20%.

License: N/A

21. U.S Patent Application Serial Number: PCT/US20/38998

UKRFID: 2341

Filed: June 22, 2020

Title: PHARMACEUTICALLY ACTIVE PYRAZOLO-PYRIDONE MODULATORS OF DCN1/2-MEDIATED CULLIN NEDDYLYATION

Inventors: Rodney Kiplin Guy, Jared Hammill and Hoshin Kim (College of Pharmacy)

Description and Application: The invention includes novel compounds exhibiting reversible inhibition of neddylation. Inhibition of neddylation has several potential disease applications, including antiviral, oncology, and Alzheimer's Disease. Current FDA-approved drugs that target this pathway have a high level of in vivo toxicity due to irreversible inhibition of neddylation. The combined markets for oncology, antiviral drugs and Alzheimer's Disease is approximately \$123 billion with growth over 6% annually.

License: N/A

Patent Activities FY19 and FY20

Total FY20					
	FY20Q1	FY20Q2	FY20Q3	FY20Q4	Total FY20
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
Total FY19					
	FY19Q1	FY19Q2	FY19Q3	FY19Q4	Total FY19
Full Patent Applications	7	7	7	7	28
Provisional Patent Applications	10	16	10	30	66
Patents Issued	2	6	7	11	26
License Income	\$1,176,827.69	\$75,162.99	\$1,149,705.55	-\$74,643.49	\$2,327,052.74

¹ Financial data retrieved July 20, 2020

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
Biomedical			
Linda Dwoskin, Zheng Cao, Justin Nickell, Na-Ra Lee, Peter Crooks, Guangrong Zheng	Pharmacy	Vesicular monoamine transporter-2 ligands and their use in the treatment of psychostimulant abuse	Administering <i>N</i> -phenylalkyl amphetamine and pharmaceutical compositions containing these compounds for the treatment of drug addiction.
Linda Dwoskin, Jon Thorson, Markos Leggas, Rodney Kiplin Guy, Jared Hammill, Derong Ding, David Watt, Stefan Kwiatkowski, Na-Ra Lee, Peter Crooks, Guangrong Zheng	Pharmacy, Medicine	Vesicular monoamine transporter-2 ligands and their use in the treatment of psychostimulant abuse	Administering <i>N</i> -phenylalkyl amphetamine and pharmaceutical compositions containing these compounds for the treatment of drug addiction.
David Minion	Medicine	Endoluminal graft system and method of implanting the same	An endoluminal graft system and method of implantation in the treatment of aneurysms.
Bjoern Bauer, Brent Sokola, Anika Hartz	Pharmacy, Medicine	5-LOX and COX-2 inhibition for treatment in connection with blood-brain barrier dysfunction	A novel epilepsy therapy using a combination of 5-lipoxygenase (5-LOX) and cyclooxygenase-2 (COX-2) inhibitors.
Chang-Guo Zhan, Fang Zheng	Pharmacy	Butyrylcholinesterase inhibitors for treatment of opioid use disorder	A treatment for heroin use using ethopropazine.
Chan-Guo Zhan, Fang Zheng, Kyungbo Kim, and Vivek Rangnekar	Pharmacy, Medicine	Modified prostate apoptosis response-4 (Par-4) polypeptide, and methods of production and use	A modified form of the prostate apoptosis response-4 protein (Par-4), which

			promotes cell death in cancer cells, but not healthy cells.
Craig Rush	Medicine	Method of treating stimulant use disorder using a combination of topiramate and phentermine	A cocaine use disorder therapy using a drug combination of topiramate and phentermine.
Gregory Bix	Medicine	Compositions and methods for enhancing neuro-repair	A method for enhancing recovery after an ischemic injury, including cerebral ischemia and stroke, by the administration of a domain V protein.
Sylvie Garneau-Tsodikova, Octavio Gonzalez	Pharmacy, Medicine	Antimicrobial compounds, compositions, and methods	A novel zafirlukast derivative that can be used as an antimicrobial agent to target <i>P. gingivalis</i> .
Rodney Kiplin Guy, Jared Hammill, Hoshin Kim	Pharmacy	Pharmaceutically active pyrazolo-pyridone modulators of DCN1/2-mediated cullin neddylation	Novel compounds exhibiting reversible inhibition of neddylation, with potential use in cancer and Alzheimer's disease.
Engineering			
Matthew Ruffner, Kevin Donohue, Michael Sikora	Engineering	A motion feedback device	A programmable electronic device that functions as an interface for creating sound through motion with special feedback and guidance.
Zhi Chen, Feng Wang	Engineering	Method for manufacturing perovskite-based devices in ambient air	A monitoring system for producing perovskite solar cells (PSC) in ambient temperatures.

Julius Schoop	Engineering	Testbed device for use in predictive modeling of manufacturing processes	A testbed that includes actuators, video microscopy system and high-resolution, throughput sensors to collect data for use in predictive modeling of machine processes.
Kunlei Liu, Xin Gao, Ayokunle Omosebi, James Landon, Jesse Thompson, Keemia Abad, Zilong Ma	CAER	Apparatus to remove harmful chemical species from industrial wastewater using iron-based products	A one-step process for removing harmful contaminants from wet flue gas desulfurization (WFGD) wastewater.
Dibakar Bhattacharyaa, Lindell Ormsbee, Rollie Mills, Mohammed Mottaleb, Anthony Saad	Engineering, Medicine	Devices and methods for removing perfluorinated compounds from contaminated water	A device and method for removing perfluorinated compounds (PFCs) from PFC-contaminated water.
Agriculture, Food and Environment			
Thomas Keene, Darrell Taulbee	Agriculture, Food and Environment, CAER	Production of fuel pellets	A process for forming fuel pellets by compressing hemp byproduct and high-moisture sawdust.
Subba R. Palli, Ramesh Dhadapani	Agriculture, Food and Environment	Modified-RNA nanoparticles for induction of RNA interference	A method of mosquito population control through gene silencing using improved chitosan nanoparticles.
Ling Yuan, Sanjay Singh, Sitakanta Pattanaik, Darlene Lawson	Agriculture, Food and Environment	BZIP transcription factors regulate conversion of nicotine to nornicotine and reduce levels of tobacco specific (TSNA) precursors	A method of decreasing conversion of nicotine to nornicotine through a variety of methods.

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.
Arts and Sciences			
Susan Odom, Giorgio Baggi	Arts and Sciences	Unique redox-active phenothiazine combinations with depressed melting points for increased solubility and method of use in energy storage and in redox flow batteries	A combination of phenothiazine derivatives to depress melting points and increase solubility to allow for higher concentrations of redox active compounds in a flow battery.
Douglas Strachan	Arts and Sciences	Cross-gap-nanopore heterostructure device and method for identifying chemical substance	A technology that allows the enables the placement of multiple electrodes in the same nanopore.