

FCR 26

Office of the President
June 17, 2022

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period January 1, 2022 to March 31, 2022.

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 January 1, 2022 TO March 31, 2022

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 Number:** 17/580,513
UKRFID: 2439
Filed: January 20, 2022
Title: METHODS OF DETECTING GLYCOGEN AND POLYGLUCAN
Inventors: Matthew Gentry, Ramon Sun and Ron Bruntz (College of Medicine)
Description and Application: This is a novel method to measure normal and diseased glycogen in mammalian tissues and biofluids as a diagnostic tool and a biomarker to track disease progression. This method may include adding isoamylase to a sample cleaving glucose chains from glycogen. A matrix-assisted laser desorption ionization (MALDI) is then applied and analyzed using matrix-assisted laser desorption ionization mass spectrometry (MALDI-MS). This method may be used to identify various diseases including Alzheimer's disease related dementia (ADRD), Lafora disease, glycogen storage diseases type 1-IV, ALS, and glycogen-rich class tumors (breast, bone, bladder, renal, and liver). The combined global market for cancer and Alzheimer's disease detection is \$150 billion with an expected compound annual growth rate (CAGR) of 8%.
License: N/A
- 2. U.S. Patent Application Number:** 17/592,763
UKRFID: 2073
Filed: February 4, 2022
Title: BIOMARKERS OF BREAST AND LUNG CANCER
Inventors: Andrew Lane, Teresa Fan and Richard Higashi (College of Medicine)
Description and Application: This is a novel method to detect and determine lipid amounts in a human suspected of having breast or lung cancer. The method includes analyzing a sample of bodily fluid from a patient to determine the lipid amounts in a lipid set. The lipid set may include various sets comprising five, ten, or fifteen lipid biomarkers. The global market for cancer detection is approximately \$144 billion with an expected CAGR of 7%.
License: N/A
- 3. U.S. Patent Application Number:** 17/638,156
UKRFID: 2172
Filed: February 24, 2022
Title: METHOD AND SYSTEM FOR SCREENING AND SELECTIVELY HARVESTING PRODUCTS FROM PLANT OR ALGAL CELLS IN CULTURE

Inventors: John Littleton, Jan Smalle, Jasmina 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 to screen for and isolate 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 is expected to reach \$5.4 billion by 2025.

License: N/A

4. **U.S. Patent Application Number:** 17/682,856

UKRFID: 2310

Filed: February 28, 2022

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, and it could be used to detect diseases such as fibrosis and cancer. The global market for cell assay kits was \$3.6 billion in 2016 and is expected to reach \$10.6 billion by 2023.

License: N/A

5. **U.S. Patent Application Number:** 17/653,059

UKRFID: 1311

Filed: March 1, 2022

Title: ALTERATION OF TOBACCO ALKALOID CONTENT THROUGH MODIFICATION OF SPECIFIC CYTOCHROME P450 GENES

Inventors: Ralph Dewey, Steven Bowen, Lily Gavilano, (North Carolina State University) and Balazs Siminszky (formerly College of Agriculture, Food and Environment)

Description and Application: This is a novel method to reduce the level of nornicotine and its metabolite, N'-nitrosonornicotine (NNN) in a plant by inhibiting the expression or function of cytochrome P450 polypeptide. The cytochrome P450 polypeptide is involved in the metabolic conversion of nicotine to nornicotine. Nornicotine found in tobacco plants has undesirable health consequences. The global tobacco market is expected to reach \$1.1 trillion by 2027 with an expected growth of 3.1%.

License: Exclusive license with Philip Morris USA, Inc.

- 6. U.S. Patent Application Number:** 17/689,458
UKRFID: 2334
Filed: March 8, 2022
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 includes a vibration motor, accelerometer, wireless connection and an onboard speaker. The device can be used as a musical instrument for music creation and in music therapy. The device is accessible to disabled individuals. The device may also be used for rehabilitation to imitate motion, such as swinging a racket or walking. An estimated 1.5 million individuals are receiving music therapy.
License: N/A
- 7. U.S. Patent Application Number:** 17/696,714
UKRFID: 2548
Filed: March 16, 2022
Title: USE OF ANIMAL BY-PRODUCTS FOR CEMENT PRODUCTION
Inventors: Robert Jewell and Tristana Duvallet (Center for Applied Energy Research)
Description and Application: This invention is a novel raw meal incorporating animal by-products for a cement clinker and improved cements made from this raw meal. Specifically, bone ash is used as a replacement for at least some of the limestone used in state-of-the-art cement production processes. The inclusion of clinkers made with bone ash increases the compression strength of the resulting cement and simultaneously allows for a reduction in carbon dioxide emissions during production. This novel cement may also be used in artificial bone applications. The global market for cement production is \$312 billion with an expected CAGR of 5.2%.
License: N/A
- 8. U.S. Patent Application Number:** 17/764,073
UKRFID: 2025
Filed: March 25, 2022
Title: METHOD FOR TREATING ALZHEIMER'S DISEASE
Inventors: Florin Despa (College of Medicine)
Description and Application: The invention is a method for treating a patient with Alzheimer's disease, microhemorrhages and neurological deficits. The method includes the administration of an agent that increases vascular low-density lipoprotein receptor-related protein 1 (LRP1) expression and reduces the amount of systemic amylin. One such method is administering an effective amount of a composition that increases epoxyeicosatrienoic acids. The composition that increases epoxyeicosatrienoic acids is a soluble epoxide hydrolase inhibitor such

as 1-(1-propanoylpiperidin-4-yl)-3-[4-(trifluoromethoxy)phenyl]urea (TPPU). The TPPU is administered orally or intravenously in a dose of about 20 micrograms per kilogram TPPU. The North American Alzheimer's disease drug market is expected to reach \$3 billion by 2025.

License: Optioned to AMDx Prognostx, Inc.

9. International Application Number: PCT/US2022/15522

UKRFID: 2559

Filed: February 7, 2022

Title: RECOVERY OF VALUABLE MATERIALS AND GRAPHITE FROM END-OF-LIFE LITHIUM-ION BATTERIES

Inventors: Kunlei Liu, Xin Gao and Neng Huang (Center for Applied Energy Research)

Description and Application: This invention is a novel method of recovery and enrichment of valuable materials, including lithium, nickel, cobalt manganese, copper and aluminum from end-of-life or manufacturer defect lithium-ion batteries. The method uses thermal reduction in an inert atmosphere to decompose the black mass of processed lithium-ion batteries. A reducing agent is applied to the black mass and the reduced black mass is mixed with water before the separation of the lithium salts. The global market for lithium-ion battery recycling is \$1.5 billion with an expected CAGR of 8.2%.

License: N/A

10. International Application Number: PCT/US2022/18941

UKRFID: 2559

Filed: March 4, 2022

Title: THREE-COORDINATE AU(I) PROBES AND USE IN SELECTIVELY DISRUPTING MITOCHONDRIA IN CANCER CELLS

Inventors: Samuel Awuah and Randall Mertens (College of Arts and Sciences)

Description and Application: The invention includes novel tri-coordinate Au(I) complexes and methods of using tri-coordinate Au(I) complexes to selectively disrupt the mitochondrial structure of target cancer cells. The novel compound works by modulating mitochondrial function in a cell. The novel compounds may also be used to increase reactive oxygen species (ROS) in a cell. The global market for cancer therapeutics is \$97 billion with an expected CAGR of 7.6%.

License: N/A

11. International Application Number: PCT/US2022/20727

UKRFID: 2534

Filed: March 17, 2022

Title: PRODUCTION OF ACTIVATED-BELITE-CSA CLINKERS AT EXTREMELY LOW FIRING TEMPERATURE

Inventors: Thomas Robl, Robert Jewell, Anne Oberlink and Tristana Duvall (Center for Applied Energy Research)

Description and Application: The invention is a novel hydraulically active α' -belite-calcium sulfoaluminate clinker that is produced at extremely low firing temperatures when compared to current commercial binders. This lower firing

temperature greatly reduces carbon emissions. The global market for cement production is \$312 billion with an expected CAGR of 5.2%.

License: N/A

- 12. International Application Number:** PCT/US2022/21112
UKRFID: 2552/2611
Filed: March 21, 2022
Title: MORTAR MIX AND CONCRETE MIX INCORPORATING A STILLAGE LIQUID
Inventors: Rodney Andrews, Robert Jewell and Anne Oberlink (Center for Applied Energy Research)
Description and Application: This is a method of using stillage liquid as an admixture in mortar and concrete in order to improve the workability of fresh concrete and to modify the properties of the hardened mortar or concrete. Stillage is the liquid waste that remains after ethanol distillation. The distillery industry produces a significant amount of stillage each year thereby creating a waste disposal concern. The global market for cement production is \$312 billion with an expected CAGR of 5.2%.
License: Option to Carbon Science Solutions, LLC in negotiations
- 13. International Application Number:** PCT/US2022/21373
UKRFID: 2468
Filed: March 22, 2022
Title: APPARATUS FOR PLACING A NEEDLE AT A SPECIFIC LOCATION AND DEPTH USING AN ULTRASOUND PROBE
Inventors: Kyle Murphy (College of Medicine)
Description and Application: This invention is a novel apparatus to place a needle at a specific location and depth using an ultrasound probe. The device allows for a physician to consistently find and place the tip of a needle at a desired location, such as in a vessel of a patient or in an abscess cavity in a relatively quick and efficient manner. The device has a needle guide aperture that can maintain a desired angle between 1°-89° relative to the longitudinal axis of the needle guide. The needle guide market is expected to exceed \$4 billion by 2024 with a CAGR of 6.2%.
License: Optioned to AVA Surgical Technologies, LLC
- 14. International Application Number:** PCT/US2022/21793
UKRFID: 2444
Filed: March 24, 2022
Title: CRADLE AND FEEDBACK MECHANISM FOR AUTOMATED DEVICE ALIGNMENT IN RADIATION THERAPY QUALITY ASSURANCE
Inventors: Janelle Molloy (formerly College of Medicine)
Description and Application: This is a novel apparatus adapted for automated quality assurance device alignment for radiation therapy quality assurance. The novel apparatus is designed to automatically reposition and change the angular orientation of a quality assurance device. The apparatus includes a base and a translation stage. The translation stage comprises a cradle, a rotation adjustment

assembly, a tile adjustment assembly and a position sensor. The radiation therapy quality assurance market is expected to reach \$36 million by 2028 with a CAGR of 4.5%.

License: Optioned to Wild Dog Physics, LLC

15. Foreign Application Number: EP20819324

UKRFID: 2183

Filed: January 4, 2022

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 to decrease the 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 method also includes 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

16. Foreign Application Number: IN 202217000448

UKRFID: 2183

Filed: January 4, 2022

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 to decrease the 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 method also includes 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

17. Foreign Application Number: KR 10-2022-7000394

UKRFID: 2341

Filed: January 5, 2022

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

Inventors: Rodney Kip Guy (College of Pharmacy), Jared Hammill, Hoshin Kim (formerly College of Pharmacy), Bhuvanesh Singh (Memorial Sloan Kettering Cancer Center), Daniel Scott (St. Jude's Children's Research Hospital) and Brenda Schulman (formerly St. Jude's Children's Research Hospital)

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 market for oncology, antiviral drugs and Alzheimer's Disease is approximately \$123 billion with growth over 6% annually.

License: Licensed to Cinsano Pharma, Inc.

18. Foreign Application Number: BD38/2022

UKRFID: 2183

Filed: January 7, 2022

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 to decrease the 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 method also includes 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

19. **Foreign Application Number:** BD39/2022

UKRFID: 2183

Filed: January 7, 2022

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 to decrease the 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 method also includes 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

Patent Activities
Fiscal Year to Date as of March 31, 2022

Total FY2021-22					
	FY22Q1	FY22Q2	FY22Q3	FY22Q4	Total FY22
Invention Disclosures ⁱ	13	20	25	0	58
Full Patent Applications ⁱⁱ	22	14	19	0	55
Provisional Patent Applications ⁱⁱⁱ	18	21	13	0	52
Patents Issued	9	12	5	0	26
License Income ^{iv}	\$925,684.76	\$73,397.91	\$204,789.15	\$0	\$1,203,871.82
New Licenses & Options Executed	8	2	10	0	20
New UK Startups Formed	0	1	2	0	3

Patent Activities
FY2020-21 as of June 30, 2021

Total FY2020-21					
	FY21Q1	FY21Q2	FY21Q3	FY21Q4	Total FY21
Invention Disclosures ⁱ	26	28	25	30	99
Full Patent Applications ⁱⁱ	23	16	22	16	77
Provisional Patent Applications ⁱⁱⁱ	26	17	19	18	80
Patents Issued	8	8	4	2	22
License Income ^v	\$810,900.86	\$209,591.78	\$1,250,404.62	\$81,934.69	\$2,352,831.95
New Licenses & Options Executed	6	3	11	7	27
New UK Startups Formed	0	0	5	1	6

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
Biomedical			
Matthew Gentry, Ramon Sun and Ron Bruntz	College of Medicine	Methods of detecting glycogen and polyglucan	A novel method to measure normal and diseased glycogen in mammalian tissues and biofluids as a diagnostic tool and a biomarker to track disease progression
Andrew Lane, Teresa Fan and Richard Higashi	College of Medicine	Biomarkers of breast and lung cancer	A novel method to detect and determine lipid amounts in a human suspected of having breast or lung cancer
Ren Xu and Shike Wang	College of Medicine	Collagen p4h1 inhibitor and its use	A novel high-throughput assay method to measure C-P4H1 activity in vitro
Florin Despa	College of Medicine	Method for treating Alzheimer's disease	A method for treating a patient with Alzheimer's disease, microhemorrhages and neurological deficits
Kyle Murphy	College of Medicine	Apparatus for placing a needle at a specific location and depth using an ultrasound probe	A novel apparatus to place a needle at a specific location and depth using an ultrasound probe

Inventors	College(s)	Title	Brief description
Janelle Molloy	College of Medicine	Cradle and feedback mechanism for automated device alignment in radiation therapy quality assurance	A novel apparatus adapted for automated quality assurance device alignment for radiation therapy quality assurance
Rodney Kip Guy, Jared Hammill, Hoshin Kim, Bhuvanesh Singh, Daniel Scott and Brenda Schulman	College of Pharmacy	Pharmaceutically active pyrazolo-pyridone modulators of dcn1/2-mediated cullin neddylation	Novel compounds exhibiting reversible inhibition of neddylation to reduce toxicity in antiviral, oncology and Alzheimer's disease treatment
Engineering			
Matthew Ruffner, Kevin Donohue and Michael Sikora	College of Engineering	A motion feedback device	A programmable electronic device that functions as an interface for creating sound through motion with special feedback for music therapy
Robert Jewell and Tristana Duvall	CAER	Use of animal by-products for cement production	A novel raw meal incorporating animal by-products for a cement clinker and improved cements made from this raw meal

Inventors	College(s)	Title	Brief description
Kunlei Liu, Xin Gao and Neng Huang	CAER	Recovery of valuable materials and graphite from end-of-life lithium-ion batteries	A novel method of recovery and enrichment of valuable materials, including lithium, nickel, cobalt manganese, copper and aluminum from end-of-life or manufacturer defect lithium-ion batteries
Thomas Robl, Robert Jewell, Anne Oberlink and Tristana Duvallet	CAER	Production of activated-belite-csa clinkers at extremely low firing temperature	A novel hydraulically active α' -belite-calcium sulfoaluminate clinker that is produced at extremely low firing temperatures to reduce carbon dioxide emissions
Rodney Andrews, Robert Jewell and Anne Oberlink	CAER	Mortar mix and concrete mix incorporating a stillage liquid	A method of using stillage liquid as an admixture in mortar and concrete in order to improve the workability of fresh concrete and to modify the properties of the hardened mortar or concrete
Agriculture, Food and Environment			
John Littleton, Jan Smalle, Jasmina Kurepa, Barbara Knutson, Stephen Rankin and Luke Bradley	College of Agriculture, Food and Environment	Method and system for screening and selectively harvesting products from plant or algal cells in culture	A method to screen for and isolate a target product from a plant or algal cell culture without destroying the plant or algal cell

Inventors	College(s)	Title	Brief description
Ralph Dewey, Steven Bowen, Lily Gavilano, and Balazas Siminszky	College of Agriculture, Food and Environment	Alteration of tobacco alkaloid content through modification of specific cytochrome p450 genes	A novel method to reduce the level of nornicotine and its metabolite, N'- nitrosonornicotine (NNN) in a plant by inhibiting the expression or function of cytochrome P450 polypeptide
Ling Yuan, Sanjay Singh, Sitakanta Pattanaik and Darlene Lawson	College of Agriculture, Food and Environment	bZIP transcription factors regulate the conversion of nicotine to nornicotine and reduce levels of tobacco specific (TSNA) precursors	A method to decrease the conversion of nicotine to nornicotine
Ling Yuan, Sanjay Singh, Sitakanta Pattanaik and Darlene Lawson	College of Agriculture, Food and Environment	bZIP transcription factors regulate the conversion of nicotine to nornicotine and reduce levels of tobacco specific (TSNA) precursors	A method to decrease the conversion of nicotine to nornicotine
Ling Yuan, Sanjay Singh, Sitakanta Pattanaik and Darlene Lawson	College of Agriculture, Food and Environment	bZIP transcription factors regulate the conversion of nicotine to nornicotine and reduce levels of tobacco specific (TSNA) precursors	A method to decrease the conversion of nicotine to nornicotine
Ling Yuan, Sanjay Singh, Sitakanta Pattanaik and Darlene Lawson	College of Agriculture, Food and Environment	bZIP transcription factors regulate the conversion of nicotine to nornicotine and reduce levels of tobacco specific (TSNA) precursors	A method to decrease the conversion of nicotine to nornicotine

Inventors	College(s)	Title	Brief description
Arts and Sciences			
Samuel Awuah and Randall Mertens	College of Arts and Sciences	Three-coordinate Au(I) probes and use in selectively disrupting mitochondria in cancer cells	Novel tri-coordinate Au(I) complexes, and methods of using tri-coordinate Au(I) complexes to selectively disrupt mitochondrial structure of the target cancer cells

ⁱ Invention disclosures include new technologies and intellectual property disclosed to the Office of Technology Commercialization (OTC) that do not fall under an existing technology number. This number captures the potential new intellectual property disclosed to OTC.

ⁱⁱ Full patent applications, as used by OTC, include nonprovisional patent application filings at the United States Patent and Trademark Office (USPTO), Patent Cooperation Treaty filings, and foreign patent application filings. These are technologies that are assigned to the University of Kentucky that OTC has identified to invest further into in an effort to obtain patent protection and are described in more detail in the patent assignment section above.

ⁱⁱⁱ Provisional patent applications are legal documents filed at the USPTO that establish a filing date and protect the owner from anticipated publication of the technology, but do not mature into an issued patent unless the applicant files a full patent application within one year. Although owned by the University of Kentucky, the provisional patent applications are not included in the patent assignment descriptions as they will not mature into full patent applications without further action and investment.

^{iv} In Q1 an additional \$200,000.00 and in Q2 an additional \$300,000.00 was received from a license to 22nd Century managed by the College of Agriculture, Food and Environment on behalf of the Office of Technology Commercialization.

^v In Q2 an additional \$300,000.00 was received from a license to 22nd Century managed by the College of Agriculture, Food and Environment on behalf of the Office of Technology Commercialization.