

FCR 12

Office of the President
June 17, 2021

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period January 1, 2021 to March 31, 2021.

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, 2021 TO March 31, 2021

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:** 17/164,481
UKRFID: 2380
Filed: February 1, 2021
Title: COMPACT ABSORPTION COLUMN FOR CO₂ CAPTURE
Inventors: Kunlei Liu and Heather Nikolic (Center for Applied Energy Research)
Description and Application: This compact CO₂ absorber utilizes a co-current fog section and froth section, and a counter current packed section. The design significantly reduces the size of the CO₂ absorber, while increasing the CO₂ mass transfer from the gas phase to the liquid phase. The increase in CO₂ mass transfer is accomplished by reducing the CO₂ diffusivity resistance at the gas-liquid interface and by increasing the specific surface area. This design is approximately 70% smaller than traditional carbon capture solutions and would decrease the cost associated with carbon capture and storage by approximately 57%. The carbon capture and storage market is more than \$4 billion and is expected to grow at a 13.5% compound annual growth rate (CAGR) until 2026.
License: N/A
- 2. U.S. Patent Application Number:** 17/164,401
UKRFID: 2414
Filed: February 1, 2021
Title: COMPOSITE MINERALIZERS/FLUXES FOR THE PRODUCTION OF ALITE/CALCIUM SULFOALUMINATE CLINKERS
Inventors: Tristana Duvall, Robert Jewell and Thomas Robl (Center for Applied Energy Research)
Description and Application: This is a low-carbon, high alite/calcium sulfoaluminate (CSA) content clinker with high compressive strength and low firing temperatures. The lower carbon content of the novel clinker can reduce CO₂ emissions during production. Clinker production currently accounts for 8% of global CO₂ emissions. The presence of iron oxide and calcium fluoride lowers the firing temperatures required, reducing production energy costs. The properties of the resulting cement exceed those of similar commercially available alternatives. The U.S. cement production market is currently valued at more than \$10 billion and is expected to experience a 5% CAGR over the next five years.
License: N/A

- 3. U.S. Patent Application Number:** 17/265,344
UKRFID: 2296
Filed: February 1, 2021
Title: PROTEASOME INHIBITORS
Inventors: Kyung Bo Kim, Zachary Miller, Deepak Bhattarai (College of Pharmacy) and Min Jae Lee (formerly College of Pharmacy)
Description and Application: This is a new class of peptide epoxyketones containing cyclic peptide backbones that selectively inhibit the immunoproteasome. The inhibition of immunoproteasome ameliorates the progression of neurodegenerative diseases such as Alzheimer's disease (AD) and age-related macular degeneration (AMD). This new class of peptide epoxyketones has a unique cyclic peptide backbone compared to current peptide epoxyketones. Unlike current proteasome inhibitors, including FDA-approved proteasome inhibitors (carfilzomib, bortezomib, ixazomib) that are susceptible to peptidases, these proteasome inhibitors are relatively resistant to peptidases, potentially improving metabolic stability and other properties. The current global market for proteasome inhibitors is more than \$1.7 billion with an expected CAGR of 8% until 2023. North America is estimated to experience 46% of this expected growth.
License: Exclusive option to Arisu Therapeutics
- 4. U.S. Patent Application Number:** 17/174,336
UKRFID: 2313
Filed: February 11, 2021
Title: POTENT AND SELECTIVE INHIBITORS OF CYTOCHROME P450
Inventors: Edith Glazer and David Heidary (College of Arts and Sciences)
Description and Application: These are new small molecule inhibitors of the enzyme cytochrome P450 (CYP), including 1B1 (CYP1B1), 1A1 (CYP1A1) and 19A1 (CYP19A1) for use in medical applications. These new small molecules may be used in chemoprevention to ameliorate malignant changes induced by CYP, or in treatment, including restoration of chemotherapeutic efficacy. The association and mechanistic rationale for the role of CYP1B1 in malignant initiation is the clearest for hormone related cancers, particularly for breast, ovarian, endometrial and prostate cancer. The global cancer chemotherapy market is expected to grow at a CAGR of around 11.4% from 2020 to 2027 and reach the market value of more than \$74 billion by 2027. The rising prevalence of cancer worldwide is primarily driving the market growth. In 2018, cancer was the second leading cause of death globally and responsible for 9.6 million deaths globally.
License: N/A

- 5. U.S. Patent Application Number:** 17/198,897
UKRFID: 2405
Filed: February 11, 2021
Title: DETECTION OF EXPRESSION OF MARKERS USEFUL FOR PREDICTING RISK OF CATASTROPHIC INJURIES IN ATHLETIC ANIMALS
Inventors: David Horohov, Allen Page and John Stewart (College of Agriculture, Food and Environment)
Description and Application: This is a novel test for gene expression detection in biological samples for non-human athletic animals. The test assists in identification of risk of catastrophic injury in non-human athletic animals based on gene expression within biological samples. Despite the work of numerous groups detailing a multitude of risk-factors associated with catastrophic injuries (CI) in Thoroughbred racehorses around the world, the ability to reduce the number of CIs in North America remains a significant challenge. Earlier detection of this damage followed by corrective action could reduce the incidence of fatal and/or career-ending injuries. The global veterinary laboratory testing services market is more than \$7.6 billion with an expected CAGR of 6.4%.
License: N/A
- 6. U.S. Patent Application Number:** 17/174,853
UKRFID: 2441
Filed: February 11, 2021
Title: HYBRID POST-COMBUSTION CO₂ CAPTURE SYSTEM AND METHOD
Inventors: Kunlei Liu (Center of Applied Energy Research)
Description and Application: A new hybrid post-combustion CO₂ capture system to capture CO₂ from flue gas. The new design includes (a) a pressure booster, to produce a compressed flue gas stream, (b) a membrane-based CO₂ separation to receive the compressed flue gas, and (c) an aqueous-based CO₂ capture unit also configured to receive a portion of the compressed flue gas stream. This new configuration allows parallel processing of the compressed flue gas stream in the membrane-based CO₂ separation unit and the aqueous-based CO₂ capture unit. The carbon capture and storage market is more than \$4 billion and is expected to grow at a 13.5% CAGR until 2026.
License: N/A
- 7. U.S. Patent Application Number:** 17/178,096
UKRFID: 2442
Filed: February 17, 2021
Title: DRUGS FOR GRP78 CELL SURFACE TRANSLOCATION AND PAR-4 SECRETION
Inventors: Vivek Rangnekar, Ravshan Burikhanov (College of Medicine) and David Watt (formerly College of Medicine)
Description and Application: This is a new and improved method of treating cancer, particularly lung cancer, using novel and effective synergistic drug combinations. The drug combination includes a first drug or active agent that induces the secretion of prostate apoptosis response-4 (PAR-4) from normal cells

and a second drug or active agent that induces or elevates the PAR-4 receptor GRP78 on the cancer cell surface. PAR-4 is a protein secreted by normal cells that induces paracrine apoptosis in cancer cells by binding to cell surface GRP78 receptors that are present mainly on the surface of cancer cells. Therefore, secreted PAR-4 kills mainly cancer cells, not normal cells. The global lung cancer therapeutics market is more than \$15 billion with an expected CAGR of 13%, and 49% of the estimated growth will come from North America.

License: N/A

8. U.S. Patent Application Number: 17/189,803

UKRFID: 1935

Filed: March 2, 2021

Title: COMPOSITIONS AND METHODS FOR TREATING RETINAL DEGRADATION

Inventors: Jayakrishna Ambati, Kameshwari Ambati and Benjamin Fowler (formerly College of Medicine)

Description and Application: This invention includes methods to treat degradation of the retinal pigment epithelium (RPE) by administering compositions of a nucleoside and/or a nucleoside reverse transcriptase inhibitor (NRTI). Geographic atrophy, an advanced form of age-related macular degeneration, causes blindness in millions of people worldwide. There are no approved treatments, and it results from death of RPE cells. The inventive treatment to reduce RPE cell death includes: 1) inhibiting inflammasome activation; 2) reducing permeability of a cell; 3) reducing the amount of mitochondrial reactive oxygen species in the cell and/or 4) inhibiting activation of at least one inflammasome in a subject's eye. The global pharmaceutical market for age-related macular degeneration was worth \$8.6 billion in 2018 and is expected to reach \$18.7 billion in 2028.

License: Exclusive license with Inflammasome Therapeutics, Inc.

9. U.S. Patent Application Number: 17/189,833

UKRFID: 1935

Filed: March 2, 2021

Title: COMPOSITIONS AND METHODS FOR TREATING RETINAL DEGRADATION

Inventors: Jayakrishna Ambati, Kameshwari Ambati and Benjamin Fowler (formerly College of Medicine)

Description and Application: This invention includes methods to treat degradation of the retinal pigment epithelium (RPE) by administering compositions of a nucleoside and/or a nucleoside reverse transcriptase inhibitor (NRTI). Geographic atrophy, an advanced form of age-related macular degeneration, causes blindness in millions of people worldwide. There are no approved treatments, and it results from death of RPE cells. The inventive treatment to reduce RPE cell death includes: 1) inhibiting inflammasome activation; 2) reducing permeability of a cell; 3) reducing the amount of mitochondrial reactive oxygen species in the cell and/or 4) inhibiting activation of at least one inflammasome in a

subject's eye. The global pharmaceutical market for age-related macular degeneration was worth \$8.6 billion in 2018 and is expected to reach \$18.7 billion in 2028.

License: Exclusive license with Inflammasome Therapeutics, Inc.

10. U.S. Patent Application Number: 17/189,870

UKRFID: 1935

Filed: March 2, 2021

Title: COMPOSITIONS AND METHODS FOR TREATING RETINAL DEGRADATION

Inventors: Jayakrishna Ambati, Kameshwari Ambati and Benjamin Fowler (formerly College of Medicine)

Description and Application: This invention includes methods to treat degradation of the retinal pigment epithelium (RPE) by administering compositions of a nucleoside and/or a nucleoside reverse transcriptase inhibitor (NRTI). Geographic atrophy, an advanced form of age-related macular degeneration, causes blindness in millions of people worldwide. There are no approved treatments, and it results from death of RPE cells. The inventive treatment to reduce RPE cell death includes: 1) inhibiting inflammasome activation; 2) reducing permeability of a cell; 3) reducing the amount of mitochondrial reactive oxygen species in the cell and/or 4) inhibiting activation of at least one inflammasome in a subject's eye. The global pharmaceutical market for age-related macular degeneration was worth \$8.6 billion in 2018 and is expected to reach \$18.7 billion in 2028.

License: Exclusive license with Inflammasome Therapeutics, Inc.

11. U.S. Patent Application Number: 17/200,210

UKRFID: 2411

Filed: March 12, 2021

Title: FLEXIBLE SUCTION COAGULATOR

Inventors: Guigen Zhang (College of Engineering), Moamen Gabr and Mark Fritz (College of Medicine)

Description and Application: This is a new flexible suction coagulator that provides both suction and coagulator functions. The flexible suction coagulator has the capability to go through flexible endoscopes. The device will be used for the control of bleeding, the cauterization of granulation tissue, and debulking tumors. Numerous devices are currently available to control bleeding, but none of these devices allow for suction at the same time in a single device. Suction is important to clear the blood and fluid allowing for better visualization which is key to procedure success. The novel flexible suction coagulator has a cautery device and may be operated in a unipolar or a bipolar excitation mode to control bleeding, and it also has a hollow lumen that can be connected to a suction device. The global endoscopic instrument market is worth \$9 billion with an expected growth of 8.8% until 2025.

License: N/A

- 12. U.S. Patent Application Number:** 17/278,070
UKRFID: 2198
Filed: March 19, 2021
Title: MITHRAMYCIN DERIVATIVES HAVING INCREASED SELECTIVITY AND ANTI-CANCER ACTIVITY
Inventors: Jurgen Rohr, Oleg Tsodikov, Markos Leggas, Caixia Hou, Joseph Eckenrode, Abhisek Mandal (College of Pharmacy) and Prithiba Mitra (formerly College of Pharmacy)
Description and Application: These are novel mithramycin (MTM) short side chain ketone (SK) derivatives and MTM short side chain diketone (SDK) derivatives for the treatment of cancer. The unique MTM SK and MTM SDK derivatives are designed to have increased selectivity toward erythroblast transformation-specific (ETS) transcription factor. ETS transcription factors such as Friend leukemia integration 1 (FLI1) and ETS related gene (ERG) have been identified as critical targets in diseases such as Ewing sarcoma. However, no therapies have yet moved from bench to bedside to impact the outcome of this disease. Ewing sarcoma, which affects primarily children and young adults is a difficult cancer to treat. Current therapies provide up to 60% long-term survival, but the cancer often returns. The global Ewing sarcoma treatment market is more than \$130 million and is expected to grow at a CAGR of 6%.
License: N/A
- 13. U.S. Patent Application Number:** 17/219,111
UKRFID: 2416
Filed: March 31, 2021
Title: COMPOSITIONS AND METHODS FOR INHIBITING GROWTH OF LACTIC ACID PRODUCING BACTERIA
Inventors: Jian Shi and Ryan Kalinoski (College of Engineering)
Description and Application: This is a novel composition and method for inhibiting lactic acid bacteria growth in a media contaminated by, or at risk of being contaminated by, one or more species of lactic acid bacteria. The novel composition and method are particularly useful in fuel ethanol fermentation processes. Fuel ethanol is commonly derived through fermentation processes which utilize yeast to ferment biomasses with high starch and sugar content. Such fermentations do not typically occur under completely aseptic conditions. This results in acute and chronic bacterial contaminations that negatively affect yeast growth and subsequent ethanol production. Traditional treatments for bacterial contamination involve the application of antibiotics; however, overuse has increased the incidence of antibiotic-resistant bacteria strains. The global biofuel market is expected to reach \$218 billion by 2022. The fermentation chemicals market is more than \$58 billion and is expected to grow at a CAGR of 6.5% until 2025.
License: N/A

- 14. International Application Number:** PCT/US21/13293
UKRFID: 2412
Filed: January 13, 2021
Title: INHIBITION OF DENND5B EXPRESSION FOR TREATING HEPATIC STEATOSIS
Inventors: Scott Gordon (College of Medicine)
Description and Application: This is a novel method of treating hepatic steatosis, specifically through the inhibition of DENND5B. The inhibition of DENND5B controls the absorption and/or accumulation of triglycerides and lipids in liver tissues. The proposed DENND5B inhibitor comprises a guide antisense strand consisting nucleotides that is designed in view of the sequence of the target gene of interest. Hepatic steatosis affects 25% of the world's population and an even higher percentage in the United States. Currently there is no treatment, and for many, progression of this disease will lead to severe liver damage and cirrhosis, necessitating a liver transplant. The global market for non-alcoholic fatty liver disease is \$1.5 billion with a CAGR of 16% until 2022.
License: N/A
- 15. International Application Number:** PCT/US21/17109
UKRFID: 2423
Filed: February 8, 2021
Title: EXTRACTION OF COPPER, GOLD AND OTHER ELEMENTS FROM WASTE MATERIALS
Inventors: Joshua Werner (College of Engineering)
Description and Application: This is a new method for enhanced recovery of copper, gold and other valuable metals and materials from waste materials. This method contacts a waste material stream with an ammonia-based lixiviant adapted to leach copper and other base metals from the waste material feed stream. At this stage copper may be recovered. The stream is then treated with a second lixiviant to leach noble metals from the stream allowing for recovery of the noble metals. Some embodiments of the novel method include a precipitation reaction to recover gold following the second lixiviant addition. This novel process may be used in combination with the novel electrowinning cell in UKRF 2455. The global metal recovery market is \$91 billion with an expected CAGR of 5% until 2024. The global market for e-waste recycling in the United States is \$15 billion with an expected CAGR of 9%.
License: Option agreement with Lexmark International, Inc.
- 16. International Application Number:** PCT/US21/17104
UKRFID: 2455
Filed: February 8, 2021
Title: ELECTROWINNING CELLS FOR THE SEGREGATION OF THE CATHODIC AND ANODIC COMPARTMENTS
Inventors: Joshua Werner (College of Engineering)
Description and Application: This is a novel spacer plate for an electrowinning cell and a new electrowinning cell and press incorporating the novel spacer plate.

The spacer plate has outlined sidewalls forming an electrolyte chamber and an electrolyte inlet and outlet. A flow restrictor extends across the electrolyte chamber dividing the electrolyte chamber into a cathode compartment and an anode compartment. The global metal recovery market is \$91 billion with an expected CAGR of 5% until 2024. The global market for e-waste recycling in the United States is \$15 billion with an expected CAGR of 9%.

License: Option agreement with Lexmark International, Inc.

17. International Application Number: PCT/US21/17720

UKRFID: 2267

Filed: February 11, 2021

Title: MACROPHAGE-DERIVED ENGINEERED VESICLES FOR TARGETED DELIVERY AND TREATMENT

Inventors: Christopher Richards (College of Arts and Sciences) and Jill Kolesar (College of Pharmacy)

Description and Application: This is a novel method of making a macrophage-derived engineered vesicle (MEV). The novel method includes a first macrophage of a first phenotype, then fragmenting the cell membrane of the first macrophage and allowing the fragmented membrane to assemble into a first phenotype MEV derived from the first macrophage. The novel method provides for the modulation of macrophage phenotypes, for example, for repolarizing macrophages from pro-inflammatory (M1) to anti-inflammatory (M2), or vice versa. This modulation allows for more efficient targeted drug delivery in the treatment of diseases such as traumatic injury and cancer. Nanomedicine is a relatively new market; however, the global market is expected to reach \$261 million by 2023 with a CAGR of 12%.

License: N/A

18. International Application Number: PCT/US21/20949

UKRFID: 2432

Filed: March 4, 2021

Title: SUBSTITUTED N-BENZHYDRYLACETAMIDE INHIBITORS OF JUMANJI DOMAIN HISTONE DEMETHYLASES FOR THE TREATMENT OF CANCER

Inventors: David Watt (formerly College of Medicine), Chunming Liu, Vitaliy Sviripa and Wen Zhang (College of Medicine)

Description and Application: These are novel substituted *N*-benzhydrylacetamide compounds that function as epigenetic regulators and thereby inhibit Wnt signaling. Wnt signaling is a key target for multiple human cancers, including colon, liver, and lung cancer. Most colorectal cancer (CRC) cases, which are the second leading cause of cancer-related mortality in the United States, involve mutations in the Wnt signaling pathway. These mutations are found primarily in the Adenomatous Polyposis Coli (APC) gene or the CTNNB1 (beta-catenin) gene, where they stabilize beta-catenin and promote cancer proliferation. Current compounds inhibit Wnt signaling in normal cells; but, unfortunately, are ineffectual for CRC cells containing Wnt pathway mutations. The global market for CRC is \$15 billion and is expected to reach \$17 billion by 2025.

License: N/A

- 19. International Application Number:** PCT/US21/21562
UKRFID: 2366
Filed: March 9, 2021
Title: MANIPULATING GLYCOGEN IN ALZHEIMER'S DISEASE, EPILEPSY, TRAUMATIC BRAIN INJURY, AND ALS AS A TREATMENT
Inventors: Matthew Gentry, Ramon Sun, Peter Nelson, Lance Johnson and Frank Gilliam (College of Medicine)
Description and Application: This is a novel method for treating neurodegenerative disease through the administration of a small molecule glycogen synthase (GYS) inhibitor, an antisense oligonucleotide targeting glycogen synthase, and antibody-enzyme fusion compound targeting polyglucosan bodies (PGBs), or combinations thereof. The method includes first administering the antibody-enzyme fusion compound to clear existing PGB-like granules in the brain. Then administering a small molecule inhibitor and the antisense oligonucleotide to inhibit new PGB formation in the brain. This method may be used to treat traumatic brain injury, Alzheimer's disease (AD), amyotrophic lateral sclerosis and epilepsy. The global market for neurodegenerative disease treatments is more than \$27 billion and has an expected CAGR of 7% until 2022. The global AD drug market is \$3 billion and has an expected CAGR of 17% until 2026.
License: Option to Maze Therapeutics, Inc. in negotiation
- 20. Foreign Application Number:** 21159854.5
UKRFID: 1935
Filed: March 1, 2021
Title: COMPOSITIONS AND METHODS FOR TREATING RETINAL DEGRADATION
Inventors: Jayakrishna Ambati, Kameshwari Ambati and Benjamin Fowler (formerly College of Medicine)
Description and Application: This invention includes methods to treat degradation of the retinal pigment epithelium (RPE) by administering compositions of a nucleoside and/or a nucleoside reverse transcriptase inhibitor (NRTI). Geographic atrophy, an advanced form of age-related macular degeneration, causes blindness in millions of people worldwide. There are no approved treatments, and it results from death of RPE cells. The inventive treatment to reduce RPE cell death includes: 1) inhibiting inflammasome activation; 2) reducing permeability of a cell; 3) reducing the amount of mitochondrial reactive oxygen species in the cell and/or 4) inhibiting activation of at least one inflammasome in a subject's eye. The global pharmaceutical market for age-related macular degeneration was worth \$8.6 billion in 2018 and is expected to reach \$18.7 billion in 2028.
License: Exclusive license with Inflammasome Therapeutics, Inc.

21. **Foreign Application Number:** EP19846893.6
UKRFID: 2296
Filed: March 1, 2021
Title: PROTEASOME INHIBITORS
Inventors: Kyung Bo Kim, Zachary Miller, Deepak Bhattarai (College of Pharmacy), and Min Jae Lee (formerly College of Pharmacy)
Description and Application: This is a new class of peptide epoxyketones containing cyclic peptide backbones that selectively inhibit the immunoproteasome. The inhibition of immunoproteasome ameliorates the progression of neurodegenerative diseases such as Alzheimer's disease (AD) and age-related macular degeneration (AMD). This new class of peptide epoxyketones has a unique cyclic peptide backbone compared to current peptide epoxyketones. Unlike current proteasome inhibitors, including FDA-approved proteasome inhibitors (carfilzomib, bortezomib, ixazomib) that are susceptible to peptidases, these proteasome inhibitors are relatively resistant to peptidases, potentially improving metabolic stability and other properties. The current global market for proteasome inhibitors is more than \$1.7 billion with an expected CAGR of 8% until 2023. 46% of the expected growth will come from North America.
License: Exclusive option to Arisu Therapeutics

Patent Activities

Fiscal year to date as of March 31, 2021

Total FY2020-21					
	FY21Q1	FY21Q2	FY21Q3	FY21Q4	Total FY21
Invention Disclosures¹	26	18	25	0	69
Full Patent Applications²	23	16	21	0	60
Provisional Patent Applications³	26	17	19	0	62
Patents Issued	8	8	4	0	20
License Income	\$810,900.86	\$209,591.78	\$1,250,404.62	\$0	\$2,270,897.26
New Licenses & Options Executed	6	3	11	0	20
New UK Startups Formed	0	0	5	0	5

Patent Activities
 FY2019-20 as of June 30, 2020

Total FY2019-20					
	FY20Q1	FY20Q2	FY20Q3	FY20Q4	Total FY20
Invention Disclosures¹	22	32	33	33	120
Full Patent Applications²	11	16	13	21	61
Provisional Patent Applications³	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
New Licenses & Options Executed	12	4	7	6	29
New UK Startups Formed	1	0	2	3	6

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
Biomedical			
Kyung Bo Kim, Zachary Miller, Deepak Bhattarai and Min Jae Lee	Pharmacy	Proteasome inhibitors	A class of peptide epoxyketones containing cyclic peptide backbones that selectively inhibit the immunoproteasome to treat neurodegenerative diseases.
Vivek Rangnekar, Ravshan Burikhanov and David Watt	Medicine	Drugs for GRP78 cell surface translocation and PAR-4 secretion	A method of treating cancer, particularly lung cancer, using novel and effective synergistic drug combinations.
Jayakrishna Ambati, Kameshwari Ambati and Benjamin Fowler	Medicine	Compositions and methods for treating retinal degradation	Novel methods to treat degradation of the retinal pigment epithelium by administering nucleoside and nucleoside reverse transcriptase inhibitors.
Jayakrishna Ambati, Kameshwari Ambati and	Medicine	Compositions and methods for treating retinal degradation	Novel methods to treat degradation of the retinal pigment epithelium by administering nucleoside and nucleoside reverse transcriptase inhibitors.

Benjamin Fowler			
Jayakrishna Ambati, Kameshwari Ambati and Benjamin Fowler	Medicine	Compositions and methods for treating retinal degradation	Novel methods to treat degradation of the retinal pigment epithelium by administering nucleoside and nucleoside reverse transcriptase inhibitors.
Guigen Zhang, Moamen Gabr and Mark Fritz	Medicine, Engineering	Flexible suction coagulator	A novel endoscopic device that allows simultaneous suction and coagulation through a single lumen.
Jurgen Rohr, Oleg Tsodikov, Markos Leggas, Caixia Hou, Joseph Eckenrode, Abhisek Mandal and Prithiba Mitra	Pharmacy	Mithramycin derivatives having increased selectivity and anti-cancer activity	A cancer treatment using novel MTM SK and SDK derivatives.
Scott Gordon	Medicine	Inhibition of DENND5B expression for treating hepatic steatosis	A novel treatment for hepatic steatosis through the inhibition of DENND5B.
Christopher Richards and Jill Kolesar	Arts and Sciences, Pharmacy	Macrophage-derived engineered vesicles (MEVs) for targeted delivery and treatment	A novel method for producing MEVs for improved drug delivery.

David Watt, Chunming Liu, Vitaliy Sviripa and Wen Zhang	Medicine	Substituted N-benzhydrylacetamide inhibitors of jumanji domain histone demethylases for the treatment of cancer	Novel substituted <i>N</i> -benzhydrylacetamide compounds that inhibit Wnt signaling to treat cancer.
Matthew Gentry, Ramon Sun, Peter Nelson, Lance Johnson and Frank Gilliam	Medicine	Manipulating glycogen in Alzheimer's disease, epilepsy, traumatic brain injury, and ALS as a treatment	A novel method to treat neurogenerative disease through administration of a small molecule GYS inhibitor, an antisense oligonucleotide targeting glycogen synthase, and antibody-enzyme fusion compound targeting PGBs.
Jayakrishna Ambati, Kameshwari Ambati and Benjamin Fowler	Medicine	Compositions and methods for treating retinal degradation	Novel methods to treat degradation of the retinal pigment epithelium by administering nucleoside and nucleoside reverse transcriptase inhibitors.
Kyung Bo Kim, Zachary Miller, Deepak Bhattarai and Min Jae Lee	Pharmacy	Proteasome inhibitors	A class of peptide epoxyketones containing cyclic peptide backbones that selectively inhibit the immunoproteasome to treat neurodegenerative diseases.
Engineering			
Kunlei Liu and Heather Nikolic	CAER	Compact absorption column for CO ₂ capture	A compact CO ₂ absorber that increases the CO ₂ mass transfer from the gas phase to the liquid phase.

Tristana Duvallet, Robert Jewell and Thomas Robl	CAER	Composite mineralizers/fluxes for the production of alite/Calcium sulfoaluminate Clinkers	A novel CSA clinker that provides high compressive strength and low firing temperatures.
Kunlei Liu	CAER	Hybrid post-combustion CO ₂ capture system and method	A novel hybrid post-combustion CO ₂ capture system that provides parallel processing of a flue gas stream.
Jian Shi and Ryan Kalinoski	Engineering	Compositions and methods for inhibiting growth of lactic acid producing bacteria	A novel composition and method to inhibit bacteria growth in the production of fuel ethanol.
Joshua Werner	Engineering	Extraction of copper, gold and other elements from waste materials	A new method of enhanced recovery of copper, gold and other valuable materials from waste materials.
Joshua Werner	Engineering	Electrowinning cells for the segregation of the cathodic and anodic compartments	A novel spacer plate for use in electrowinning presses and cells.
Agriculture, Food and Environment			
David Horohov, Allen Page and John Stewart	Agriculture, Food and Environment	Detection of expression of markers useful for predicting risk of catastrophic injuries in athletic animals	A novel test for gene expression detection to identify the risk of catastrophic injury of non-human athletes.
Arts and Sciences			
Edith Glazer and David Heidary	Arts and Sciences	Potent and selective inhibitors of cytochrome P450	A new small molecule inhibitor of CYP to maintain the effectiveness of chemotherapy.

¹ 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.

² Full patent applications, as used by OTC, include nonprovisional patent applications 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.

³ 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.