

FCR 20

Office of the President
December 13, 2022

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period July 1, 2022 to September 30, 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 July 1, 2022 TO September 30, 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: 17/858,652**
UKRFID: 2560
Filed: July 6, 2022
Title: SPINNERET, BLOWING SYSTEM AND METHOD FOR PRODUCING HOLLOW FIBERS
Inventors: Matthew Weisenberger (Center for Applied Energy Research)
Description and Application: This is a new and improved hollow fiber microfilm blowing system using a new spinneret. The novel spinneret includes a gaseous fluid passageway within its inner wall. The global market for hollow carbon fiber is approximately \$2.25 billion with an expected Compound Annual Growth Rate (CAGR) of -10.9% until 2025.
License: N/A
- 2. U.S. Patent Application Number: 17/861,981**
UKRFID: 2300
Filed: July 11, 2022
Title: HIGH SPEED MULTI-AXIS MACHINE TOOL
Inventors: Julius Schoop (College of Engineering)
Description and Application: The invention is an improved multi-axis shaper for planing of curved features into a workpiece at high-peak cutting forces. This invention would improve machining capabilities for complex aerospace components that require high tolerances. The machining market is currently \$341.91 billion globally and is expected to grow at a rate of 6 percent until 2022. The precision machining market holds a market size of 70 percent and is expected to increase.
License: N/A
- 3. U.S. Patent Application Number: 17/862,585**
UKRFID: 2586
Filed: July 12, 2022
Title: PRODUCTION OF FUEL PELLETS INCLUDING HEMP AND/OR KENAF WASTE BYPRODUCT
Inventors: Thomas Keene (College of Agriculture, Food and Environment) and Darrell Taulbee (formerly Center for Applied Energy Research)

Description and Application: The invention is a novel binder-free pellet composition made from a hemp byproduct, a kenaf byproduct or a combination thereof, with coal fines. The composition is compressed and extruded forming the binder-free fuel pellet. The global market for wood pellets is approximately \$8.8 billion with an expected CAGR of 9.4%.

License: N/A

4. U.S. Patent Application Number: 17/792,388

UKRFID: 2412

Filed: July 12, 2022

Title: INHIBITION OF DENND5B EXPRESSION FOR TREATING HEPATIC STEATOSIS

Inventors: Scott Gordon (College of Medicine)

Description and Application: The invention is a novel method of treating hepatic steatosis 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 utilizes a guide antisense strand with nucleotides designed to target the gene of interest. Hepatic steatosis affects about 25% of the world's population and an even higher percentage in the United States. Currently there is no treatment for hepatic steatosis, 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

5. U.S. Patent Application Number: 17/863,024

UKRFID: 2607

Filed: July 12, 2022

Title: PHOTON-INDUCED ACCELERATED ENZYMES AND BIOACTIVE COMPOUNDS ACCUMULATION IN BARLEY DURING MALTING

Inventors: Akinbode Adedeji (College of Engineering) and Al Fadhl Y Al Khaled (formerly College of Engineering)

Description and Application: The invention is a method of increasing the rate of accumulation of hydrolytic enzymes and bioactive compounds in seed allowing for a shorter germination period during malting. The invention applies photon energy to barley seeds during the germination step to induce stress. The global market for malted barley is \$14 billion with a CAGR of 5.5%.

License: N/A

6. U.S. Patent Application Number: 17/868,585

UKRFID: 2491

Filed: July 19, 2022

Title: CO₂ CAPTURE AND UTILIZATION SYSTEM AND METHOD

Inventors: Kunlei Liu (College of Engineering), Mark Crocker and Heather Nikolic (Center for Applied Energy Research)

Description and Application: The invention is a system for capturing CO₂ using dual-function NH₃ looping, an indirect membrane CO₂ absorber, and a solvent

regenerator. The solvent regenerator delivers just-in-time CO₂ and NH₃ distribution to reduce CO₂ capture cost and provide improved algae and cyanobacteria production. The global market for carbon capture is \$4.7 billion with an expected CAGR of 8% to 11% until 2027.

License: N/A

7. U.S. Patent Application Number: 17/877,378

UKRFID: 2215

Filed: July 29, 2022

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 administering a domain V protein, perlecan. Perlecan is an extracellular matrix proteoglycan that has been shown to influence the formation of neurons during development. 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 following stroke up to seven days. The global market for stroke diagnostics and therapeutics is currently \$23 billion with an expected growth of 7.3% annually.

License: N/A

8. U.S. Patent Application Number: 17/879,370

UKRFID: 2587

Filed: August 2, 2022

Title: BIOMASS FUEL SLURRY AND METHOD OF MAKING THE SAME

Inventors: Kunlei Liu (College of Engineering) and Heather Nikolic (Center for Applied Energy Research)

Description and Application: The invention is a novel method of making a biomass fuel slurry. The biomass fuel slurry includes biomass material and plastic material suspended in water. The biomass material is encapsulated in a thin layer of plastic. This advantageously closes the pores, reducing the effective pore volume and resulting in reduced water uptake by the biomass during slurry preparation. The biomass power market is expected to reach \$127 billion by 2030.

License: N/A

9. U.S. Patent Application Number: 17/880,101

UKRFID: 2362

Filed: August 3, 2022

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 a 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 abuse market is approximately \$4 billion with an expected growth rate of 12.4% until 2024.

License: N/A

- 10. U.S. Patent Application Number:** 17/881,448
UKRFID: 2640
Filed: August 4, 2022
Title: ELECTROCHEMICAL CELL, METHOD AND APPARATUS FOR CAPTURING CARBON DIOXIDE FROM FLUE GAS AND DECOMPOSING NITROSAMINE COMPOUNDS
Inventors: Jesse Thompson, Keemia Abad, Saloni Bhatnager, Xin Gao (Center for Applied Energy Research), Kunlei Liu (College of Engineering) and James Landon (formerly College of Engineering)
Description and Application: The invention is a novel electrochemical cell used to capture carbon dioxide from flue gas and decomposing nitrosamine compounds. The electrochemical cell includes an anode and cathode. The anode and cathode each have a permeable carbon cloth electrode and current collectors. The global market for wastewater treatment is currently \$283 billion with a CAGR of 7.3%.
License: N/A
- 11. U.S. Patent Application Number:** 17/797,692
UKRFID: 2423
Filed: August 4, 2022
Title: EXTRACTION OF COPPER, GOLD AND OTHER ELEMENTS FROM WASTE MATERIALS
Inventors: Joshua Werner (College of Engineering)
Description and Application: This invention 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 is recovered. The stream is then treated with a second lixiviant to leach and recover noble metals from the stream. 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 University of Kentucky Research Foundation (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: Licensed to Neocycl Holdings, Inc.
- 12. U.S. Patent Application Number:** 17/797,687
UKRFID: 2455
Filed: August 4, 2022
Title: ELECTROWINNING CELLS FOR THE SEGREGATION OF THE CATHODIC AND ANODIC COMPARTMENTS
Inventors: Joshua Werner (College of Engineering)

Description and Application: This invention 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: Licensed to Neocycl Holdings, Inc.

13. U.S. Patent Application Number: 17/883,482

UKRFID: 2255

Filed: August 8, 2022

Title: HEAT-INTEGRATED TRANSFORMATIVE CARBON DIOXIDE CAPTURE PROCESS

Inventors: Kunlei Liu (College of Engineering), Jesse Thompson, Amanda Warriner, Heather Nikolic and Fan Zhen (Center for Applied Energy Research)

Description and Application: The invention is a novel apparatus and method for capturing carbon dioxide from an acid gas stream. The apparatus has at least three packing segments, including specific surface area packing, wherein the surface area in a first packing segment is less than the surface area in a second packing segment, and the surface area in the second packing segment is less than the surface area in a third packing segment. The invention includes at least one in-situ liquid/gas distributor. The global market for carbon capture is \$4.7 billion with an expected CAGR of 8% to 11% until 2027.

License: N/A

14. U.S. Patent Application Number: 17/798,391

UKRFID: 2463

Filed: August 9, 2022

Title: COMPOSITIONS AND METHODS FOR TREATING MALARIA

Inventors: Rodney Kip Guy (College of Pharmacy), Jared Hammill (formerly College of Pharmacy), Spencer Knapp, Robert Barrows and Christopher Davis (Rutgers University)

Description and Application: The invention is a novel treatment for malaria. The invention utilizes tetrahydrobenzopyridine carboxanilide (TBN) derivatives and related pyrrolinones and hydrolysis products. These compounds are active against *Plasmodium falciparum* strains that are resistant to multiple drugs currently on the market. The global malaria vaccine market is estimated at \$41 billion with an expected CAGR of 29% until 2030.

License: N/A

- 15. U.S. Patent Application Number:** 17/799,082
UKRFID: 2267
Filed: August 11, 2022
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 invention 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 allows 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
- 16. U.S. Patent Application Number:** 17/888,235
UKRFID: 2332
Filed: August 15, 2022
Title: ALGAE CULTIVATION MEDIUM AND METHOD OF INCREASING CARBON SHUTTLLING IN AN ALGAE CULTIVATION MEDIUM
Inventors: Jesse Thompson, Michael Wilson, Mark Crocker, Moushumi Sarma (Center for Applied Energy Research), Kunlei Liu (College of Engineering) and Leland Widger (formerly Center for Applied Energy Research)
Description and Application: The invention is a system for increasing CO₂ uptake in algae-containing media. The system uses amine solvents commonly used to convert CO₂ to bicarbonate. The bicarbonate can then more easily be shuttled into the algae-containing media via a designed complex that mimics the mechanism of the carbonic anhydrase enzyme found in human lungs. As a result of the equilibrium between bicarbonate and CO₂, the bicarbonate will increase the concentration of CO₂ in the media. The biomimetic complex has been shown to be stable at operating conditions (high temperature, flue gas contaminants) that would otherwise not be favorable for carbonic anhydrase. The market for algae products is currently \$3.98 billion globally and is expected to grow at 5% per year until 2023. The market for carbon capture is currently approximately \$4.25 billion and with a CGAR of 13%.
License: N/A

- 17. U.S. Patent Application Number:** 17/907,943
UKRFID: 2432
Filed: August 29, 2022
Title: SUBSTITUTED N-BENZHYDRYLACETAMIDE INHIBITORS OF JAMANJI 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: The invention is novel substituted N-benzhydrylacetamide compounds that function as epigenetic regulators to inhibit Wnt signaling. Wnt signaling is a key target for multiple cancers, including but not limited to colon, liver and lung cancers. For example, most of the 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
- 18. U.S. Patent Application Number:** 17/908,827
UKRFID: 2366
Filed: September 1, 2022
Title: MANIPULATING GLYCOGEN IN ALZHEIMER'S DISEASE, EPILEPSY, TRAUMATIC BRAIN INJURY, AND ALS AS A TREATMENT
Inventors: Matthew Gentry, Ramon Sun (formerly College of Medicine), Peter Nelson, Lance Johnson (College of Medicine) and Frank Gilliam
Description and Application: This invention is a novel method for treating neurodegenerative disease through the administration of a small molecule 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 \$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: In negotiation with Atterogen, LLC

- 19. U.S. Patent Application Number:** 17/951,895
UKRFID: 2581
Filed: September 23, 2022
Title: ELECTROCHEMICAL REACTOR SYSTEM AND METHOD
Inventors: Kunlei Liu, Jesse Thompson, Ayokunle Omosibi, Leland Widger, Daniel Moreno (Center for Applied Energy Research) and James Landon (formerly Center for Applied Energy Research)
Description and Application: The invention is a novel electrochemical reactor system that uses molecular charge carrier compounds to transfer electrochemical equivalents from an electrode-containing charging cell to a separate reactor. The separate reactor contains a catalyst/enzyme that utilizes the transferred charge to electrochemically mediate a reaction. The global market for fuel cells is expected to reach \$14.6 billion by 2027 with a CAGR of 20.4%.
License: N/A
- 20. International Application Number:** PCT/US2022/74065
UKRFID: 2539
Filed: July 22, 2022
Title: INHIBITION OF NEUROFIBRILLARY TANGLES USING OLIGONUCLEOTIDES AGAINST CIRCULAR RNAs FROM THE MICROTUBULE ASSOCIATED PROTEIN TAU (MAPT) LOCUS
Inventors: Stefan Stamm and Justin Welden (College of Medicine)
Description and Application: This invention is a novel method of targeting neurofibrillary tangles and related tauopathies by targeting circular RNAs. Targeting occurs by back splicing between exons from the microtubule associated protein tau (MAPT) locus, and by targeting translation thereof, to increase the translation of MAPT and other circular RNAs through adenosine to inosine (A>I) RNA editing. The global market for Alzheimer's therapeutics was \$18 billion in 2018 with an expected CAGR of 4.6% until 2026.
License: Optioned to CirCure Corporation
- 21. International Application Number:** PCT/US2022/75391
UKRFID: 2584
Filed: August 24, 2022
Title: DOWNREGULATION OF CIRCULATING GHRELIN AND THERAPEUTIC APPLICATIONS THEREOF
Inventors: Chang-Guo Zhan and Fang Zheng (College of Pharmacy)
Description and Application: This invention is a novel method of treating substance use disorder by inactivating ghrelin by administering a ghrelin hydrolase to convert the ghrelin to desacyl-ghrelin. The ghrelin hydrolase includes butyrylcholinesterase polypeptide variant. The treatment is also useful for appetite control or as an anti-obesity therapeutic. The global market for appetite control is \$191 billion with an expected CAGR between 6-9%. The global market for substance use disorder was \$10 billion in 2021 with an expected CAGR of 9% until 2031.
License: N/A

- 22. International Application Number:** PCT/US2022/45136
UKRFID: 2609
Filed: September 29, 2022
Title: QUALITY ASSURANCE SYSTEM AND METHOD
Inventors: Janelle Molloy, Allison Palmiero and Justin Visak (formerly College of Medicine)
Description and Application: This invention is a novel apparatus adapted for automated quality assurance device alignment for radiation therapy. 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 tilt 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: Option in Negotiations
- 23. Foreign Application Number:** EP21750864.7
UKRFID: 2423
Filed: August 25, 2022
Title: EXTRACTION OF COPPER, GOLD AND OTHER ELEMENTS FROM WASTE MATERIALS
Inventors: Joshua Werner (College of Engineering)
Description and Application: The invention 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 is recovered. The stream is then treated with a second lixiviant to leach and recover noble metals from the stream. 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: Licensed to Neocycl Holdings, Inc.

Patent Activities
Fiscal Year to Date as of September 2022

Total FY2021-22					
	FY23Q1	FY23Q2	FY23Q3	FY23Q4	Total FY23
Invention Disclosures ⁱ	23	0	0	0	23
Full Patent Applications ⁱⁱ	23	0	0	0	23
Provisional Patent Applications ⁱⁱⁱ	23	0	0	0	23
Patents Issued	8	0	0	0	8
License Income	\$317,370.67	\$0	\$0	\$0	\$317,370.67
New Licenses and Options Executed	7	0	0	0	7
New UK Startups Formed	3	0	0	0	3

Patent Activities
FY2021-22 as of June 30, 2022

Total FY2021-22					
	FY22Q1	FY22Q2	FY22Q3	FY22Q4	Total FY22
Invention Disclosures	13	20	25	33	91
Full Patent Applications	24	20	19	12	75
Provisional Patent Applications	18	21	13	16	68
Patents Issued	9	12	5	6	32
License Income	\$925,684.76	\$73,397.91	\$204,789.15	\$91,141.99	\$1,295,013.81
New Licenses and Options Executed	8	2	10	10	30
New UK Startups Formed	0	1	2	1	4

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
Biomedical			
Scott Gordon	College of Medicine	Inhibition of DENND5B expression for treating hepatic steatosis	A novel method to treat fatty liver disease by inhibiting DENND5B.
Gregory Bix	College of Medicine	Compositions and methods for enhancing neuro-repair	A novel method to enhance recovery from an ischemic stroke by administering perlecan.
Craig Rush	College of Medicine	Method of treating stimulant use disorder using a combination of topiramate and phentermine	A novel treatment for cocaine use disorder using a combination of topiramate-phentermine.
Rodney Kip Guy, Jared Hammill, Spencer Knapp, Robert Barrows, and Christopher Davis	College of Pharmacy	Compositions and methods for treating malaria	A novel treatment for malaria.
Christopher Richards and Jill Kolesar	College of Pharmacy	Macrophage-derived engineered vesicles for targeted delivery and treatment	A novel method of making macrophage-derived engineered vesicles.

Inventors	College(s)	Title	Brief description
David Watt, Chunming Liu, Vitaliy Sviripa, and Wen Zhang	College of Medicine	Substituted n-benzhydrylacetamide inhibitors of jamanji domain histone demethylases for the treatment of cancer	Novel compounds that function as epigenetic regulators to inhibit Wnt signaling to treat cancer.
Matthew Gentry, Ramon Sun, Peter Nelson, Lance Johnson, and Frank Gilliam	College of Medicine	Manipulating glycogen in Alzheimer's disease, epilepsy, traumatic brain injury, and ALS as a treatment	A novel method to treat neurogenerative disease by administering a small molecule synthase inhibitor.
Stefan Stamm and Justin Welden	College of Medicine	Inhibition of neurofibrillary tangles using oligonucleotides against circular RNAs from the microtubule associated protein tau (MAPT) locus	A novel method of targeting neurofibrillary tangles by targeting circular RNAs.
Chang-Guo Zhan and Fang Zheng	College of Pharmacy	Downregulation of circulating ghrelin and therapeutic applications thereof	A novel method to treat substance use disorder by inactivating ghrelin.
Janelle Molloy, Allison Palmiero, and Justin Visak	College of Medicine	Quality assurance system and method	A novel apparatus for automated quality assurance device alignment for radiation therapy.

Inventors	College(s)	Title	Brief description
Engineering			
Matthew Weisenberger	CAER	Spinneret, blowing system and method for producing hollow fibers	An improved hollow carbon fiber microfilm blowing system.
Julius Schoop	College of Engineering	High speed multi-axis machine tool	An improved multi-axis shaper for planning of curved features into a workpiece at high cutting forces.
Akinbode Adedeji and Al Fadhli Y Al Khaled	College of Engineering	Photon-induced accelerated enzymes and bioactive compounds accumulation in barley during malting	A method to reduce the germination period during malting.
Kunlei Liu, Mark Crocker, and Heather Nikolic	College of Engineering, CAER	CO ₂ capture and utilization system and method	A system to capture CO ₂ using dual function NH ₃ looping, an indirect membrane CO ₂ absorber and a solvent regenerator.
Kunlei Liu and Heather Nikolic	College of Engineering, CAER	Biomass fuel slurry and method of making the same	A novel method of making a biomass fuel slurry.

Inventors	College(s)	Title	Brief description
Jesse Thompson, Keemia Abad, Saloni Bhatnager, Xin Gao, Kunlei Liu, and James Landon	CAER, College of Engineering	Electrochemical cell, method and apparatus for capturing carbon dioxide from flue gas and decomposing nitrosamine compounds	A novel electrochemical cell to capture carbon dioxide from flue gas and decomposing nitrosamine compounds.
Joshua Werner	College of Engineering	Extraction of copper, gold and other elements from waste materials	A new method to recover copper, gold and other valuable metals from waste material.
Joshua Werner	College of Engineering	Electrowinning cells for the segregation of the cathodic and anodic compartments	A novel electrowinning cell with a new spacer plate.
Kunlei Liu, Jesse Thompson, Amanda Warriner, Heather Nikolic, and Fan Zhen	College of Engineering, CAER	Heat-integrated transformative carbon dioxide capture process	A novel apparatus to capture carbon dioxide from an acid gas stream.

Inventors	College(s)	Title	Brief description
Jesse Thompson, Michael Wilson, Mark Crocker, Moushumi Sarma, Kunlei Liu, and Leland Widger	CAER, College of Engineering	Algae cultivation medium and method of increasing carbon shuttling in an algae cultivation medium	A novel system to increase carbon dioxide uptake in algae-containing media.
Kunlei Liu, Jesse Thompson, Ayokunle Omosebi, Leland Widger, Daniel Moreno, and James Landon	College of Engineering, CAER	Electrochemical reactor system and method	A novel electrochemical reactor system using molecular charge carrier compounds.
Joshua Werner	College of Engineering	Extraction of copper, gold and other elements from waste materials	A new method to recover copper, gold and other valuable metals from waste material.
Agriculture, Food and Environment			
Thomas Keene and Darrell Taulbee	College of Agriculture, Food and Environment	Production of fuel pellets including hemp and/or kenaf waste byproduct	A novel binder-free hemp byproduct fuel pellet.

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.