FCR 18

Office of the President
September 12, 2024

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period April 1, 2024 to June 30, 2024.

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, 2024 TO June 30, 2024

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:** 18/626,636
UKRFID: 2663
Filed: April 4, 2024
Title: A METHOD TO PRODUCE COLLAGEN AS THERAPEUTICS AND BIOMATERIALS
Inventors: Houfu Guo (College of Medicine)
Description and Application: The invention involves a novel bacterial expression system to produce collagen. Manufactured human recombinant collagens can be used as tissue cultures and biological implants. Collagen may also be used for the treatment of rheumatoid arthritis. The global collagen market was $9.8 billion in 2023 and is expected to grow at a compound annual growth rate (CAGR) of 9.6% until 2030.
License: N/A

2. **U.S. Patent Application Number:** 18/640,714
UKRFID: 2638
Filed: April 19, 2024
Title: CENTRAL NERVOUS SYSTEM MODULATORS AS COVID-19 THERAPEUTICS
Inventors: Linda Dwoskin, Jill Turner Ortinski (College of Pharmacy) and Bobbi Jo Mullins
Description and Application: The invention is a novel repurposed use of memantine and ifenprodil to treat COVID-19 symptoms. Study results show that the administration of memantine and ifenprodil significantly reduces COVID-19 respiratory symptoms. The global COVID-19 therapeutics market was $30.7 billion in 2021 and is expected to decrease at a CAGR of -8.3% until 2031 with a projected market of $16.2 billion.
License: NA

3. **U.S. Patent Application Number:** 18/659,851
UKRFID: 2758
Filed: May 9, 2024
Title: SILVER RECOVERY FROM END-OF-LIFE SILICON SOLAR PANELS
Inventors: Kunlei Lui, Xin Gao, Min Xiao (College of Engineering) and Aron Patrick (PPL Electric Utilities)
Description and Application: The invention is a novel method to recycle solar panels. The novel process includes delaminating solar panels to generate fumed acetic acid. The produced fumed acetic acid is then used to dissolve silver from

the silicon wafers of the solar panels. The global solar panel recycling market is currently $385 million and is expected to reach $931 million by 2029 with a CAGR of 19.3%.
License: N/A

4. **U.S. Patent Application Number:** 18/660,700
UKRFID: 2760
Filed: May 10, 2024
Title: SUB-TEXTURED PACKING FOR GAS SEPARATION
Inventors: Kunlei Lui, Jesse Thompson, and Min Xao (College of Engineering)
Description and Application: The invention is a novel sub-textured packing fabricated by 3D printing. Typical 3D printing materials such as polylactic acid (PLA), acrylonitrile butadiene styrene (ABS), high impact polystyrene (HIPS) and nylon are used. The 3D printing process creates an additional wavy sub-texture on the packing surface. This novel packing material can be used in standard scrubber systems. The global scrubber system market was valued at $5 billion in 2022 and is expected to reach $6.7 billion by 2027 at a CAGR of 6.1%.
License: N/A

5. **U.S. Patent Application Number:** 18/665,035
UKRFID: 2745
Filed: May 15, 2024
Title: APPARATUS AND METHOD FOR CARBON CAPTURE VIA ELECTROCHEMICAL-MEMBRANE SEPARATION
Inventors: Kunlei Liu, Xin Gao, and Ayokunle Omosebi (College of Engineering)
Description and Application: The invention is a novel unit for capturing carbon dioxide from an untreated flue gas stream. An electrochemical unit is combined with an absorber and a mixing tank to release carbon dioxide by acid-base neutralization. The global carbon capture market is expected to reach $12.9 billion by 2030 with a CAGR of 24%.
License: N/A

6. **U.S. Patent Application Number:** 18/669,897
UKRFID: 2756
Filed: May 21, 2024
Title: METHOD FOR RECYCLING END-OF-LIFE SOLAR PANELS
Inventors: John Groppo, Lucas Bertucci and Zebulon Hart (College of Engineering)
Description and Application: The invention is a novel method for recycling end-of-life solar panels. The method includes removing the glass cover by soaking the panel in polar solvents under pressure. The solar cells can then be shredded and subjected to electrostatic separation. The global solar panel recycling market is currently $385 million and is expected to reach $931 million by 2029 with a CAGR of 19.3%.
License: N/A

7. **U.S. Patent Application Number:** 18/712,573
UKRFID: 2627
Filed: May 22, 2024
Title: NOVEL PIEZOELECTRIC TRANSITION METAL HALOMETALLATES
Inventors: Aron Huckaba, Michael Wells and Jacob Hempel (College of Arts and Sciences)
Description and Application: The invention involves novel organic-inorganic hybrid metallates (OIHM) for use in piezoelectrics, materials that generate an electric charge in response to applied mechanical stress. The new OIHMs are cost effective and considerably outperform state-of-the-art piezoelectric materials. The global piezoelectric market was $30.8 billion in 2022 and is expected to reach $52.8 billion by 2032 with a CAGR of 5.7%.
License: N/A

8. **U.S. Patent Application Number:** 18/716,131
UKRFID: 2592
Filed: June 3, 2024
Title: DIAMINOBUTOXY-SUBSTITUTED ISOFLAVONOIDS AS MITOCHONDRIAL COMPLEX I INHIBITORS FOR CANCER TREATMENT
Inventors: Chunming Liu, H. Peter Spielman (College of Medicine), David Watt (formerly College of Medicine) and Xifu Liu (Hebei Normal University)
Description and Application: The invention involves novel isoflavonoids as potential anticancer agents. The isoflavonoids inhibit mitochondrial complex I thereby inhibiting cell proliferation of multiple cancer types, including colon, liver, ovarian, lung, prostate and breast. The global oncology market is expected to reach $521.60 billion by 2033 with an expected CAGR of 8.9%.
License: N/A

9. **U.S. Patent Application Number:** 18/733,409
UKRFID: 2296
Filed: June 4, 2024
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: The invention involves a new class of peptide epoxyketones with cyclic peptide backbones that selectively inhibit the immunoproteasome. This immunoproteasome inhibition ameliorates the progression of neurodegenerative diseases such as Alzheimer's disease (AD) and age-related macular degeneration (AMD). Current proteasome inhibitors, including FDA-approved proteasome inhibitors (carfilzomib, bortezomib, ixazomib) are susceptible to peptidases, enzymes that break down simple peptides. This new class of proteasome inhibitors with a cyclic peptide backbone component is relatively resistant to peptidases, potentially improving metabolic stability and other properties. The global market for proteasome inhibitors is expected to reach $2.9 billion by 2028 with a CAGR of 7.5%.
License: Exclusive option to Arisu Therapeutics

10. **U.S. Patent Application Number:** 18/737,578
UKRFID: 2774
Filed: June 7, 2024
Title: HOLLOW CARBON FIBERS AS MECHANICALLY ROBUST THERMAL INSULATING MATERIALS
Inventors: Matthew Weisenberger and Elizabeth Morris (College of Engineering)
Description and Application: The invention is a novel thermal insulating material using hollow carbon fibers. The novel insulting material includes 60 weight percentage (wt%) to about 90 wt% hollow carbon fibers and about 40 wt% to about 60 wt% matrix material. The global thermal insulating global market is expected to reach $96 billion by 2028 with a CAGR of 6%.
License: N/A

11. **U.S. Patent Application Number:** 18/740,914
UKRFID: 2705
Filed: June 12, 2024
Title: SYSTEM AND METHOD FOR MIXED MULTIPLE CELL LINE SCREENING USING ENDOGENOUS SINGLE NUCLEOTIDE POLYMORPHISM (SNP)-BASED CELL LINE IDENTIFICATION
Inventors: Chunming Lui (College of Medicine) and Chi Wang (College of Arts and Sciences)
Description and Application: The invention is a novel method for screening a test compound against multiple cell lines. The key feature of the screening method is identifying allele frequencies of single nucleotide polymorphisms in a treating mixture and in a control mixture. The global cell screening market is expected to reach $33.9 billion by 2028 at a CAGR of 10.9%.
License: N/A

12. **U.S. Patent Application Number:** 18/744,158
UKRFID: 2792
Filed: June 14, 2024
Title: A MINIMALLY INVASIVE SINGLE PORT PULSATILE VENTRICULAR ASSIST DEVICE
Inventors: Dongfang Wang, Joseph Zwischenberger, Cherry Ballard-Croft, Li Li, (College of Medicine) and Jinsong Chen
Description and Application: The invention is a novel pulsatile ventricular assist device with a single port. The device includes a valved single lumen cannula and a valveless single port diaphragm displacement pump. To alternate between blood pumping and withdrawal, diaphragm displacement pumps have two valved ports for inlet and outlet blood. The global ventricular assist device market is expected to reach $3 billion by 2032 with a CAGR of 7.1%.
License: N/A

13. **U.S. Patent Application Number:** 18/743,737
UKRFID: 2796
Filed: June 14, 2024
Title: SUBSTITUTED MONOHYDRAZIDES AS POTENT ANTIFUNGAL AGENTS
Inventors: Sylvie Garneau-Tsodikova (College of Pharmacy)
Description and Application: The invention involves novel monohydrazides with high potency against a broad panel of fungal pathogens. The global antifungal drug market is expected to reach $22.8 billion by 2033 with a CAGR of 3.5%.
License: N/A

14. **U.S. Patent Application Number:** 18/748,909
UKRFID: 2747
Filed: June 19, 2024
Title: ADAPTIVE ONLINE CONDITION MONITORING
Inventors: Peng Wang and Matthew Russell (College of Engineering)
Description and Application: The invention involves a novel system to monitor machine condition from unlabeled sensing data. The sensors capture acceleration and high-frequency time series inputs from an operating rotating machine. The global machine condition monitoring market size is expected to reach $7 billion by 2030 with a CAGR of 10.5%.
License: N/A

15. **U.S. Patent Application Number:** 18/750,348
UKRFID: 2807
Filed: June 21, 2024
Title: TRIMERIC COPPER CATALYSTS, INTERMEDIATES FOR MAKING SUCH CATALYSTS AND METHOD FOR PREPARING A CYCLOADDITION COMPOUND
Inventors: Aron Huckaba and Alexander Olivelli (College of Arts and Sciences)
Description and Application: The invention involves a novel research tool for the performance of copper (Cu) catalyzed azide alkyne cycloaddition in living systems. The novel tool is not deactivated by oxygen or peroxide like current methods. The global laboratory chemicals market was $27.7 billion in 2023 with an expected CAGR of 4.3% until 2028.
License: N/A

16. **International Application Number:** PCT/US2024/24117
UKRFID: 2815
Filed: April 11, 2024
Title: MITHRAMYCIN (MTM) 2' OXIMES
Inventors: Jon Thorson, Yang Liu, Aarajana Shrestha (College of Pharmacy) and Markos Leggas (formerly College of Pharmacy)
Description and Application: The invention involves novel mithramycin oximes to treat cancer and neuro-diseases. The global oncology market is expected to reach $521.6 billion by 2033 with an expected CAGR of 8.9%.
License: N/A

17. **International Application Number:** PCT/US2024/27940
UKRFID: 2768
Filed: May 6, 2024
Title: PHOTOTHERMAL POLYMERIC AEROGELS FOR WASTEWATER DETOXIFICATION AND WATER RECYCLING
Inventors: Rick Honaker and Mostafa Khodakarami (College of Engineering)
Description and Application: The invention involves novel photothermal polymeric aerogels for wastewater detoxification and water recycling. The aerogels are made from natural polymers with highly porous interconnected channels that contain numerous functional groups with coordination capability for heavy metals. These aerogels would be useful in the mining industry. The global water and wastewater treatment market is expected to reach $536 billion with a CAGR of 7.5%.
License: N/A

18. **International Application Number:** PCT/US2024/35569
UKRFID: 2710
Filed: May 26, 2024
Title: TARGETED DESTRUCTION OF PASK BY PEPTIDE-BASED DEGRON
Inventors: Chintan Kikani (College of Arts and Sciences)
Description and Application: The invention is a novel degron peptide including a Per-Arnt-Sim kinase (PASK) protein or fragment fused to an amino acid. The PASK targeting peptide or PASK interacting motif (PIM) is derived from a region within PASK that interacts with the PAS domains and can contribute to kinase activity. PASK inhibition may be a therapeutic for improved insulin sensitivity, lowering hepatic lipogenesis, and improvement in hyperglycemia. The global non-alcoholic fatty liver disease market is expected to reach $108 billion by 2030.
License: N/A

19. **Foreign Application Number:** EP 22877294.3
UKRFID: 2609
Filed: April 4, 2024
Title: QUALITY ASSURANCE DEVICE FOR A MEDICAL ACCELERATOR
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 automatically repositions and changes the angular orientation of a quality assurance device. The apparatus includes a base and a translation stage. The translation stage includes a cradle, rotation adjustment assembly, tile adjustment assembly, and position sensor. The radiation therapy quality assurance market is expected to reach $36 million by 2028 with a CAGR of 4.5%.
License: Licensed to Iridesce Solutions, Inc.

20. **Foreign Application Number:** AU2022356262
UKRFID: 2609
Filed: April 8, 2024
Title: QUALITY ASSURANCE DEVICE FOR A MEDICAL ACCELERATOR
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 automatically repositions and changes the angular orientation of a quality assurance device. The apparatus includes a base and a translation stage. The translation stage includes a cradle, rotation adjustment assembly, tile adjustment assembly, and position sensor. The radiation therapy quality assurance market is expected to reach $36 million by 2028 with a CAGR of 4.5%.
License: Licensed to Iridesce Solutions, Inc.

Patent Activities
Fiscal Year to Date as of June 30, 2024

Total FY2023-24					
	FY24Q1	FY24Q2	FY24Q3	FY24Q4	Total FY24
Invention Disclosures[i]	24	34	49	35	142
Full Patent Applications[ii]	22	16	14	20	72
Provisional Patent Applications[iii]	18	15	25	20	78
Patents Issued	11	13[1]	8[2]	11	43
License Income	$446,360.22	$3,380,740.08	$332,705.97	$186,954.53	$4,346,760.80
New Licenses and Options Executed	13	17	14	22	66
New UK Startups Formed	2	3	0	2	7

[1] Capture of late reporting from Licensee.
[2] Capture of late reporting from Licensees.

Patent Activities
FY2022-23

Total FY2022-23					
	FY23Q1	FY23Q2	FY23Q3	FY23Q4	Total FY23
Invention Disclosures[iv]	24	34	31	25	114
Full Patent Applications[v]	25	15	16	11	67
Provisional Patent Applications[vi]	24	20	23	27	94
Patents Issued	8	6	12	6	32
License Income	$317,370.67	$172,263.56	$103,698.50	$214,573.50	$807,906.23
New Licenses and Options Executed	7	5	14	11	37
New UK Startups Formed	3	0	1	1	5

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
Biomedical			
Houfu Guo	College of Medicine	A method to produce collagen as therapeutics and biomaterials	A novel bacterial expression system to produce collagen.
Linda Dwoskin, Jill Turner Ortinski and Bobbi Jo Mullins	College of Pharmacy	Central nervous system modulators as COVID-19 therapeutics	A novel re-purposed use of memantine and ifenprodil to treat COVID-19 symptoms.
Chunming Liu, H. Peter Spielman, David Watt and Xifu Liu	College of Medicine	Diaminobutoxy-substituted isoflavonoids as mitochondrial complex I inhibitors for cancer treatment	Novel isoflavonoids as potential anticancer agents.
Kyung Bo Kim, Zachary Miller, Deepak Bhattarai and Min Jae Lee	College of Pharmacy	Proteasome inhibitors	A new class of peptide epoxyketones with cyclic peptide backbones that selectively inhibit the immunoproteasome.
Janelle Molloy, Allison Palmiero and Justin Visak	College of Medicine	Quality assurance device for a medical accelerator	Novel apparatus adapted for automated quality assurance device alignment for radiation therapy.

Inventors	College(s)	Title	Brief description
Janelle Molloy, Allison Palmiero and Justin Visak	College of Medicine	Quality assurance device for a medical accelerator	Novel apparatus adapted for automated quality assurance device alignment for radiation therapy.
Chunming Lui and Chi Wang	College of Medicine	System and method for mixed multiple cell line screening using endogenous single nucleotide polymorphism (snp)-based cell line identification	A novel method for screening a test compound against multiple cell lines.
Dongfang Wang, Joseph Zwischenberger, Cherry Ballard-Croft, Li Li and Jinsong Chen	College of Medicine	A minimally invasive single port pulsatile ventricular assist device	A novel pulsatile ventricular assist device with a single port.
Sylvie Garneau-Tsodikova	College of Pharmacy	Substituted monohydrazides as potent antifungal agents	Novel monohydrazides with high potency against a broad panel of fungal pathogens.
Jon Thorson, Yang Liu, Aarajana Shrestha and Markos Leggas	College of Pharmacy	Mithramycin (MTM) 2' oximes	Novel mithramycin oximes to treat cancer and neuro-diseases.

Inventors	College(s)	Title	Brief description
Janelle Molloy, Allison Palmiero and Justin Visak	College of Medicine	Quality assurance device for a medical accelerator	A novel apparatus adapted for automated quality assurance device alignment for radiation therapy.
Janelle Molloy, Allison Palmiero and Justin Visak	College of Medicine	Quality assurance device for a medical accelerator	A novel apparatus adapted for automated quality assurance device alignment for radiation therapy.
Engineering			
Kunlei Lui, Xin Gao, Min Xiao and Aron Patrick	College of Engineering	Silver recovery from end-of-life silicon solar panels	A novel method of recycling solar panels.
Kunlei Lui, Jesse Thompson and Min Xao	College of Engineering	Sub-textured packing for gas separation	A novel sub-textured packing fabricated by 3D printing.
Kunlei Liu, Xin Gao and Ayokunle Omosebi	College of Engineering	Apparatus and method for carbon capture via electrochemical-membrane separation	A novel unit to capture carbon dioxide from an untreated flue gas stream.
John Groppo, Lucas Bertucci and Zebulon Hart	College of Engineering	Method for recycling end-of-life solar panels	A novel method for recycling end-of-life solar panels.

Inventors	College(s)	Title	Brief description
Matthew Weisenberger and Elizabeth Morris	College of Engineering	Hollow carbon fibers as mechanically robust thermal insulating materials	A novel thermal insulating material using hollow carbon fibers.
Peng Wang and Matthew Russell	College of Engineering	Adaptive online condition monitoring	A novel system to monitor machine condition from unlabeled sensing data.
Rick Honaker and Mostafa Khodakarami	College of Engineering	Photothermal polymeric aerogels for wastewater detoxification and water recycling	Novel photothermal polymeric aerogels for wastewater detoxification and water recycling.
College of Arts and Sciences			
Aron Huckaba, Michael Wells and Jacob Hempel	College of Arts and Sciences	Novel piezoelectric transition metal halometallates	Novel organic-inorganic hybrid metallates for use in piezoelectrics.
Aron Huckaba and Alexander Olivelli	College of Arts and Sciences	Trimeric copper catalysts, intermediates for making such catalysts and method for preparing a cycloaddition compound	A novel research tool for the performance of Cu catalyzed azide alkyne cycloaddition.
Chintan Kikani	College of Arts and Sciences	Targeted destruction of PASK by peptide-based degron	A novel degron peptide including a PASK protein or fragment fused to an amino acid.

[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] 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.

[v] 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.

[vi] 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.