

# FCR 14

Office of the President  
February 21, 2025

Members, Board of Trustees:

## PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period October 1, 2024 to December 31, 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.

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Action taken:  Approved     Disapproved     Other \_\_\_\_\_

PATENT ASSIGNMENTS  
FOR THE PERIOD October 1, 2024 TO December 31, 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:** 18/941,989  
**UKRFID:** 2854  
**Filed:** November 8, 2024  
**Title:** METHODS FOR IN VIVO DELIVERY AND DETECTION OF CLUSTERED REGULARLY INTERSPACED SHORT PALINDROMIC REPEAT SYSTEMS UTILIZING BACULOVIRUS VECTOR-MAGNETIC NANOPARTICLE  
**Inventors:** Sheng Tong and Xiaoyue Yang (College of Engineering)  
**Description and Application:** The invention is a novel delivery method for clustered regularly interspaced short palindromic repeat (CRISPR) based gene editing. Traditional delivery methods for CRISPR can result in uncontrolled gene editing in normal tissue inducing genotoxicity. This innovation uses baculoviral vector (BV)-magnetic nanoparticle (MNP) (BV-MNP) complexes to facilitate *in vivo* delivery of CRISPR systems to inhibit to achieve a desired immune response. The global gene editing market is currently \$9.3 billion and is expected to reach \$40.10 billion by 2034 with a compound annual growth rate (CAGR) of 15.73%.  
**License:** N/A
- 2. U.S. Patent Application Number:** 18/943,349  
**UKRFID:** 2262  
**Filed:** November 11, 2024  
**Title:** CROSS-GAP-NANOPORE HETEROSTRUCTURE DEVICE AND METHOD FOR IDENTIFYING CHEMICAL SUBSTANCE  
**Inventors:** Douglas Strachan (College of Arts and Sciences)  
**Description and Application:** The invention is a novel device to determine the presence of chemical substances. The invention enables the placement of multiple electrodes in the same nanopore. The electrodes end at the edge of the nanopore allowing unimpeded flow of fluids and other substrates through the nanopore. Nanopores have many applications, particularly in sensing biological or chemical

species. Notably, nanopores are used in the sequencing of deoxyribonucleic acid (DNA). This invention may also be used in manufacturing membrane filtration systems. The combined global markets for DNA sequencing, nanomaterials and membrane filtration is approximately \$23 billion, with expected CAGR of 11% to 20%.

**License:** NA

**3. U.S. Patent Application Number:** December 6, 2024

**UKRFID:** 2684

**Filed:** December 6, 2024

**Title:** LOW STRENGTH CEMENTITIOUS COMPOSITION AND PROCESS FOR PONDED AND LANDFILLED COAL ASH

**Inventors:** Robert Jewell (Center for Applied Energy Research)

**Description and Application:** The invention is a low-strength cementitious grout developed from ponded or landfill coal ash. Coal ash is a byproduct of burning coal in power plants and poses both environmental and health risks. This innovation is a new method of using this waste product to make cementitious material. The global coal ash market was \$7 billion in 2023 and is expected to reach \$23 billion by 2032.

**License:** In Negotiations

**4. U.S. Patent Application Number:** 18/874,832

**UKRFID:** 2686

**Filed:** December 13, 2024

**Title:** METHODS AND COMPOSITIONS OF INHIBITING DCN1-UBC12 INTERACTION

**Inventors:** Leah Kovalic, Tucker Moseley, R. Kip Guy and Kristen Begely (College of Pharmacy)

**Description and Application:** This invention is a novel compound to treat cancer. By inhibiting the DCN1-UBC12 interaction, the compound limits DCN1 expression that is associated with squamous cell carcinomas and other cancers. The global cancer treatment market was \$169 billion in 2023 with a CAGR of 9.1% from 2022 to 2030.

**License:** N/A

**5. International Application Number:** PCT/US2024/55060

**UKRFID:** 2783

**Filed:** November 8, 2024

**Title:** OPIOID COMPOUNDS

**Inventors:** Thomas Prisinzano, Jill Turner Ortinski (College of Pharmacy) and Michael Bardo (College of Arts and Sciences)

**Description and Application:** This invention is a novel class of compounds with potent analgesic activity. Members of this class are as potent as fentanyl *in vivo* and considerably longer acting. Additionally, the safety profiles of the compounds are considerably higher than fentanyl and other treatments for opioid use disorder. The global analgesic market was \$38.6 billion in 2022 and is expected to grow at an annual CAGR of 6% until 2030.

**License:** N/A

**6. International Application Number:** PCT/US2024/59374

**UKRFID:** 2702

**Filed:** December 10, 2024

**Title:** A NOVEL TYPE OF SYNTHETIC HDL AS AN EFFECTIVE THERAPY FOR SEPSIS AND RELATED DISEASES

**Inventors:** Chang-Guo Zhan, Fang Zheng, Yaxia Yuan, (College of Pharmacy), Xiangan Li and Ling Guo (College of Medicine)

**Description and Application:** The invention is a novel treatment for sepsis. High-density lipoprotein (HDL) is a major component in circulation. HDL levels are reduced to 30%-70% in septic patients. Novel synthetic HDLs are used to target HDL and provides effective protection against sepsis. The global sepsis therapeutic market was \$4.6 billion in 2023 and is expected to reach \$7.1 billion by 2030.

**License:** N/A

**7. International Application Number:** PCT/US2024/60961

**UKRFID:** 2778

**Filed:** December 19, 2024

**Title:** TAK1 Kinase Inhibitors

**Inventors:** Mark Lovell (College of Arts and Sciences) and Thomas Prisinzano (College of Pharmacy)

**Description and Application:** The invention is a novel class of TAK1 kinase inhibitors. TAK1 kinase is strongly associated with neurodegeneration in Alzheimer's disease and over expression of kinase can drive neurodegeneration. The novel compounds may also treat degenerating neurons in traumatic chronic encephalopathy (TCE) associated with repeat head injuries in athletes. The global market for Alzheimer's disease treatment was \$2.4 billion in 2023 and is expected to reach \$19.3 billion by 2033.

**License: N/A**

Patent Activities  
Fiscal Year to Date as of December 31, 2024

<b>Total FY2024-25</b>					
	FY25Q1	FY25Q2	FY25Q3	FY25Q4	Total FY25
Invention Disclosures <sup>i</sup>	22	29	0	0	51
Full Patent Applications <sup>ii</sup>	15	7	0	0	22
Provisional Patent Applications <sup>iii</sup>	27	17	0	0	44
Patents Issued	9	9	0	0	18
License Income	\$427,185.01	\$572,731.30	\$0	\$0	\$1,037,860.31 1
New Licenses and Options Executed	29	16	0	0	45
New UK Startups Formed	1	0	0	0	1

<sup>1</sup> The Estate Whiskey Alliance, founded and managed by UK Innovate, received \$37,944.00 in licensing income for the University of Kentucky “EWA” trademarks.

Patent Activities  
FY2023-24

<b>Total FY2023-24</b>					
	FY24Q1	FY24Q2	FY24Q3	FY24Q4	Total FY24
Invention Disclosures	24	34	49	35	142
Full Patent Applications	22	16	14	20	72
Provisional Patent Applications	18	15	25	20	78
Patents Issued	11	13	8	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

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
<b>Biomedical</b>			
Leah Kovalic, Tucker Moseley, R. Kip Guy and Kristen Begely	College of Pharmacy	Methods and compositions of inhibiting DCN1-UBC12 interaction	A novel method to treat cancer.
Thomas Prisinzano, Jill Turner Ortinski and Michael Bardo	College of Pharmacy	Opioid compounds	A novel class of potent analgesics.
Chang-Guo Zhan, Fang Zheng, Yaxia Yuan, Xiangnan Li and Ling Guo	College of Pharmacy	A novel type of synthetic HDL as an effective therapy for sepsis and related diseases	A novel treatment for sepsis.



<b>Inventors</b>	<b>College(s)</b>	<b>Title</b>	<b>Brief description</b>
<b>Engineering</b>			
Sheng Tong and Xiaoyue Yang	College of Engineering	Methods for in vivo delivery and detection of clustered regularly interspaced short palindromic repeat systems utilizing baculovirus vector-magnetic nanoparticle	A novel delivery method for CRISPR-based gene editing.
<b>College of Arts and Sciences</b>			
Douglas Strachan	College of Arts and Sciences	Cross-gap-nanopore heterostructure device and method for identifying chemical substance	Novel device to determine chemical substances.
Mark Lovell and Thomas Prisinzano	College of Arts and Sciences	TAK1 kinase inhibitors	Novel TAK1 kinase inhibitor to treat Alzheimer's disease.
<b>Center for Applied Energy Research</b>			
Robert Jewell	Center for Applied Energy Research	Low strength cementitious composition and process for ponded and landfilled coal ash	A novel cementitious material using coal ash.

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<sup>i</sup> 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.

<sup>ii</sup> 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.

<sup>iii</sup> 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.