

FCR 14

Office of the President
February 20, 2026

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period October 1, 2025 to December 31, 2025.

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 October 1, 2025 TO December 31, 2025

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:** 19/355,903
UKRFID: 2718
Filed: October 10, 2025
Title: A STAGED-FEED POST-COMBUSTION CO₂ CAPTURE TECHNOLOGY FOR A FLUE GAS STREAM
Inventors: Kunlei Liu, Zhen Fan, Reynolds Frimpong (Pigman College of Engineering) and Heather Nikolic (formerly Pigman College of Engineering)
Description and Application: This invention is an advanced post-combustion carbon capture system that uses staged absorbent feeds, staged solvent regeneration and integrated thermal management to capture CO₂ from flue gas streams, particularly from natural gas combined cycle power plants. By controlling temperature profiles within both the absorber and stripper and splitting solvent flows at multiple levels, the system achieves very high CO₂ capture efficiency (≥95%) while significantly reducing solvent degradation and regeneration energy requirements. Key advantages include lower specific reboiler duty, elimination of auxiliary flue-gas blowers through in-duct direct contact cooling, reduced capital footprint and improved overall power plant efficiency compared to conventional amine-based systems. The technology is well suited for retrofitting existing power plants and other large stationary emission sources facing tightening carbon-reduction regulations. The global carbon capture, utilization and storage market was valued at approximately \$3 billion to \$4 billion in 2023 and is projected to grow at a compound annual growth rate (CAGR) of 15%–20% through the early 2030s.
License: N/A
- 2. U.S. Patent Application Number:** 19/474,614
UKRFID: 2815
Filed: October 10, 2025
Title: MITHRAMYCIN (MTM) 2' OXIMES

Inventors: Jon Thorson, Yang Liu (College of Pharmacy), Aarajana Shrestha and Markos Leggas (formerly College of Pharmacy)

Description and Application: This invention is a new class of drug candidates derived from mithramycin, designed to more safely and effectively treat cancers and certain neurological diseases driven by abnormal gene regulation. The compounds work by selectively blocking transcription factors that are known drivers of aggressive cancers, addressing a key limitation of existing therapies that are either ineffective or highly toxic. Compared to earlier versions of mithramycin, these new compounds are designed to improve safety, selectivity and therapeutic performance while preserving anti-cancer activity. The technology has potential applications across multiple high-unmet-need cancers, including sarcomas, leukemias, prostate cancer and brain tumors, as well as selected neurodegenerative diseases. The global oncology therapeutics market exceeds \$200 billion and is projected to grow at a CAGR 10%–12%.

License: N/A

3. U.S. Patent Application Number: 19/374,268

UKRFID: 2967

Filed: October 30, 2025

Title: END-TO-END RANGE-BASED CONTROLLERS FOR NAVIGATING ENVIRONMENTS

Inventors: Hasan Poonwala (Pigman College of Engineering)

Description and Application: This invention is a new software approach that helps autonomous robots navigate complex environments such as warehouses, hospitals and factories more safely and reliably without needing detailed maps. It processes real-time sensor data to make movement decisions on the fly, enabling robots to adapt to changing surroundings and avoid obstacles more effectively than traditional navigation systems. Key advantages include improved safety around people and objects, reduced system complexity, lower deployment costs and greater reliability in dynamic, high-traffic settings. The technology is especially useful for autonomous mobile robots used in logistics, manufacturing and service applications. The global Autonomous Mobile Robots market is projected to grow to \$4.56 billion by 2030, with a 15.1% CAGR.

License: N/A

- 4. U.S. Patent Application Number:** 19/482,196
UKRFID: 2768
Filed: November 6, 2025
Title: PHOTOTHERMAL POLYMERIC AEROGELS FOR WASTEWATER DETOXIFICATION AND WATER RECYCLING
Inventors: Rick Honaker and Mostafa Khodakarami (Pigman College of Engineering)
Description and Application: This innovation is a new class of lightweight, porous materials designed to remove toxic contaminants from wastewater while enabling efficient water reuse. The aerogels combine polymer networks with nanoscale materials that convert light into heat, allowing them to rapidly break down or capture pollutants using low-energy inputs such as sunlight. Key advantages include high contaminant removal efficiency, low material weight, reusability, and reduced energy and chemical requirements compared to conventional wastewater treatment methods. The technology is applicable to industrial wastewater treatment, environmental remediation and decentralized water recycling systems. The global water and wastewater treatment market is over \$300 billion and is projected to grow at a CAGR of 7%.
License: N/A
- 5. U.S. Patent Application Number:** 19/387,411
UKRFID: 2858
Filed: November 12, 2025
Title: ROTAVIRUS B VIRUS-LIKE-PARTICLE COMPOSITIONS AND ANTIBODY ASSAYS
Inventors: Feng Li and Dan Wang (Martin-Gatton College of Agriculture, Food and Environment)
Description and Application: This invention is a vaccine and diagnostic platform based on non-infectious virus-like particles designed to prevent and detect Rotavirus B infections, particularly in horses and other livestock. The approach uses engineered viral proteins that mimic the structure of the live virus, triggering protective immune responses without the safety risks of live or attenuated vaccines. Key advantages include improved safety, the ability to confer maternal immunity to newborn animals, and addressing a disease area for which no approved Rotavirus B vaccines currently exist. The technology is especially relevant to the equine industry, where Rotavirus B causes severe diarrheal disease in foals and significant

economic losses. The global rotavirus vaccine market was valued at \$9.7 billion in 2024 and is projected to reach \$15.9 billion by 2030, representing a CAGR of 8.5%.

License: N/A

6. U.S. Patent Application Number: 19/387,371

UKRFID: 2950

Filed: November 12, 2025

Title: GOLD CONTAINING COMPOUNDS AND METHODS OF USE

Inventors: Samuel Awuah (College of Arts and Sciences)

Description and Application: This invention is a new class of water-soluble, gold-based small molecules designed to selectively disrupt mitochondrial energy production in cancer cells and other diseases driven by metabolic dysfunction. The compounds target a key mitochondrial control protein (VDAC1), enabling them to interfere with tumor energy metabolism rather than directly damaging DNA, which may reduce resistance and side effects associated with traditional chemotherapies. Key advantages include a novel mechanism of action, potential effectiveness against treatment-resistant cancers and applicability across oncology and inflammatory disease indications. The technology has potential use in difficult-to-treat cancers such as breast, prostate, melanoma and brain cancers, as well as inflammatory bowel diseases where mitochondrial dysfunction plays a role. The global cancer therapeutics market was valued at \$169 billion in 2023 and is projected to grow at a CAGR of 9% through 2030.

License: N/A

7. U.S. Patent Application Number: 19/395,653

UKRFID: 2972

Filed: November 20, 2025

Title: ENGINEERED EXOSOMES AND METHODS FOR PRODUCING THE SAME

Inventors: Sheng Tong and Xiaoyue Yang (Pigman College of Engineering)

Description and Application: This invention is an advanced reactor system designed to improve how chemicals and pharmaceutical ingredients are manufactured using continuous-flow processing rather than traditional batch methods. By precisely controlling fluid movement and mixing inside the reactor, the system enables more consistent product quality, higher efficiency and safer operation at both laboratory

and industrial scales. Key advantages include reduced manufacturing costs, improved scalability, lower waste generation and easier transition from research to commercial production. The technology is applicable to pharmaceutical manufacturing, specialty chemicals, fine chemicals and advanced materials production. The global continuous flow chemistry market was valued at \$2.1 billion in 2023 and is projected to grow at a CAGR of 12% through 2030.

License: N/A

8. U.S. Patent Application Number: 19/406,329

UKRFID: 2419

Filed: December 2, 2025

Title: NANOPARTICLE-BASED SYSTEMS FOR DETECTING ANALYTES

Inventors: Bruce Webb (Martin-Gatton College of Agriculture, Food and Environment), Barbara Knutson and Stephen Rankin (Pigman College of Engineering)

Description and Application: This invention is a novel diagnostic platform that uses engineered nanoparticles to rapidly detect DNA, RNA, proteins and other biological targets in research, clinical and point-of-care settings. The system works by selectively capturing target molecules and generating a strong optical signal without relying on complex enzymatic amplification steps, enabling faster and simpler testing. Key advantages include high sensitivity, reduced assay time, fewer processing steps and the ability to perform testing outside of centralized laboratories. The technology is well suited for genetic screening, infectious disease testing, biomedical research and decentralized diagnostics. The global in-vitro diagnostics market was valued at approximately \$110 billion in 2023 and is projected to grow at a CAGR of 6% through 2030.

License: N/A

9. U.S. Patent Application Number: 19/410,074

UKRFID: 2933

Filed: December 5, 2025

Title: AEROSOL FORMULATION FOR APPLYING AN ULTRA-HIGH TEMPERATURE CERAMIC COATING

Inventors: Julius Schoop and Daniel Caudill (Pigman College of Engineering)

Description and Application: This invention is a novel manufacturing method that enables ultra-high-temperature ceramic coatings to be applied to surfaces using aerosolized nanoparticle inks at or near room temperature. Unlike conventional ceramic coating techniques that require extreme heat and pressure, this approach allows precise, stress-free deposition followed by localized laser sintering, improving adhesion and durability while protecting the underlying material. Key advantages include reduced manufacturing complexity, improved coating performance and the ability to apply advanced thermal-protection materials to metals, ceramics and composites. The technology is well suited for aerospace, defense, energy and industrial applications such as turbine components, hypersonic systems and thermal protection structures. The global thermal spray and advanced ceramic coatings market was valued at \$13 billion in 2023 and is projected to grow at a CAGR of 6% through 2030.

License: N/A

10. International Application Number: PCT/US2025/054489

UKRFID: 3002

Filed: November 7, 2025

Title: VISUAL DOSIMETRY DEVICE

Inventors: John Anthony (College of Arts and Sciences)

Description and Application: This invention is a lightweight, wearable radiation-monitoring device that provides immediate, easy-to-understand visual indication of radiation exposure without using electronics, batteries or laboratory analysis. It relies on passive materials that remain visually indistinguishable until specific radiation dose thresholds are reached, at which point clear visual indicators appear to signal escalating exposure levels. Key advantages include rapid field triage, minimal training requirements, ruggedness under extreme conditions and scalability for large-scale deployment in military, emergency response and industrial settings. The device is particularly valuable in radiological incidents where fast, individualized exposure awareness is critical for decision-making and personnel safety. The global radiation detection, monitoring and safety market was valued at \$4 billion in 2023 and is projected to grow at a CAGR of 6%.

License: N/A

11. International Application Number: PCT/US2025/059163

UKRFID: 2970

Filed: December 11, 2025

Title: OPIOID COMPOUNDS

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

Description and Application: This invention covers a new class of opioid-based compounds designed to provide effective pain relief while addressing key limitations of existing opioid medications, such as safety risks, side effects and misuse potential. The compounds are engineered to interact with opioid receptors in a more controlled manner, offering opportunities to improve efficacy while reducing adverse outcomes commonly associated with conventional opioids. Key advantages include the potential for improved safety profiles, differentiated receptor activity and flexibility to tailor the compounds for specific pain or clinical indications. The technology is intended for use in pain management and related therapeutic areas where there remains a strong need for safer, next-generation treatments. The global pain management therapeutics market was valued at \$75 billion in 2023 and is projected to grow at a CAGR of 5% through 2030.

License: N/A

12. Foreign Patent Application Number: JP 2025-179885

UKRFID: 2428

Filed: October 24, 2025

Title: NEW ANTI-MALARIAL AGENTS

Inventors: Rodney Kip Guy and Jared Hammill (formerly College of Pharmacy)

Description and Application: This invention covers a new class of small-molecule compounds designed to treat malaria by targeting biological pathways essential for parasite survival. The compounds are engineered to improve potency and selectivity, addressing growing concerns around drug resistance that limit the effectiveness of existing anti-malarial therapies. Key advantages include the potential for oral administration, compatibility with scalable pharmaceutical manufacturing and flexibility to optimize the compounds for different malaria strains. The technology is intended for use in global health settings, including both treatment and resistance-management strategies in malaria-endemic regions. The global anti-malarial drug

market was valued at \$1.1 billion in 2023 and is projected to grow at a CAGR of 5% through 2030.

License: N/A

Patent Activities
Fiscal Year to Date as of December 31, 2025

Total FY2025-26					
	FY26Q1	FY26Q2	FY26Q3	FY26Q4	Total FY26
Invention Disclosures ⁱ	42	26	0	0	68
Full Patent Applications ⁱⁱ	20 ¹	12	0	0	32
Provisional Patent Applications ⁱⁱⁱ	29 ²	19	0	0	48
Patents Issued	12	12	0	0	24
License Income	\$551,786.05	\$522,581.31	\$0	\$0	\$1,074,367.36
New Licenses and Options Executed	9 ³	9	0	0	18
New UK Startups Formed	0	0	0	0	0

¹ Capture of licensee filed application

² Capture of filed provisional application

³ Correction of execution date

Patent Activities
FY2024-25

Total FY2024-25					
	FY25Q1	FY25Q2	FY25Q3	FY25Q4	Total FY25
Invention Disclosures	22	30	37	29	118
Full Patent Applications	15	7	22	19	63
Provisional Patent Applications	28	17	24	22	91
Patents Issued	11	30	14	6	61
License Income	\$427,185.01	\$572,731.30	\$905,046.77	\$318,024.05	\$2,222,987.13
New Licenses and Options Executed	29	14	25	15	83
New UK Startups Formed	1	0	0	0	1

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
Biomedical			
Jon Thorson, Yang Liu, Aarajana Shrestha and Markos Leggas	College of Pharmacy	Mithramycin (MTM) 2' oximes	A new class of drug candidates derived from mithramycin
Thomas Prisinzano, Jill Turner Ortinski, Michael Bardo and Warren Alilain	College of Pharmacy	Opioid compounds	A new class of opioid-based compounds to provide effective pain relief
Rodney Kip Guy and Jared Hammill	College of Pharmacy	New anti-malarial agents	A new class of small-molecule compounds to treat malaria
Engineering			
Kunlei Liu, Zhen Fan, Reynolds Frimpong and Heather Nikolic	Pigman College of Engineering	A staged-feed post- combustion CO2 capture technology for a flue gas stream	An advanced post-combustion carbon capture system
Hasan Poonwala	Pigman College of Engineering	End-to-end range-based controllers for navigating environments	A new software approach that helps autonomous robots navigate complex environments

Inventors	College(s)	Title	Brief description
Rick Honaker and Mostafa Khodakarami	Pigman College of Engineering	Photothermal polymeric aerogels for wastewater detoxification and water recycling	A new class of lightweight, porous materials to remove toxic contaminants from wastewater
Sheng Tong and Xiaoyue Yang	Pigman College of Engineering	Engineered exosomes and methods for producing the same	An advanced reactor system to improve how chemicals and pharmaceutical ingredients are manufactured
Bruce Webb, Barbara Knutson and Stephen Rankin	Pigman College of Engineering	Nanoparticle-based systems for detecting analytes	A novel diagnostic platform that uses engineered nanoparticles to rapidly detect DNA, RNA, proteins and other biological targets
Julius Schoop and Daniel Caudill	Pigman College of Engineering	Aerosol formulation for applying an ultra-high temperature ceramic coating	A novel manufacturing method that uses aerosolized nanoparticle inks to apply ultra-high-temperature ceramic coatings
Martin-Gatton College of Agriculture, Food and Environment			
Feng Li and Dan Wang	Martin-Gatton College of Agriculture, Food and Environment	Rotavirus B virus-like-particle compositions and antibody assays	A vaccine and diagnostic platform based on non-infectious virus-like particles designed to prevent and detect Rotavirus B
College of Arts and Sciences			
Samuel Awuah	College of Arts and Sciences	Gold containing compounds and methods of use	A new class of water-soluble, gold-based small molecules that selectively disrupt mitochondrial energy production in cancer cells

Inventors	College(s)	Title	Brief description
John Anthony	College of Arts and Sciences	Visual dosimetry device	A lightweight, wearable radiation-monitoring device

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.