

FCR 23

Office of the President
June 30, 2026

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period January 1, 2026 to March 31, 2026.

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, 2026 TO March 31, 2026

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:** 19/506,885
UKRFID: 2668
Filed: January 29, 2026
Title: COMPOUNDS CONTAINING ORGANOMETALIC STABILIZED GOLD (III) MACROCYCLES
Inventors: Samuel Awuah, Sailajah Gukathan and Chibuzor Olelewe (College of Arts and Sciences)
Description and Application: This invention covers a new class of organometallic-stabilized gold (III) macrocycle compounds designed as anti-cancer agents, particularly for aggressive cancers such as triple-negative breast cancer and ovarian cancer. The technology is intended to overcome limitations of existing platinum-based chemotherapy, including resistance, toxicity and cross-resistance, by using a differentiated gold-based mechanism that targets mitochondrial function, oxidative phosphorylation and HMOX2-related cancer metabolism. Key advantages include activity against aggressive and platinum-resistant cancer models, inhibition of cancer stem-like cell populations associated with relapse, disruption of mitochondrial respiration and ATP production, and preclinical tumor-growth reduction with evidence of tolerability in mouse studies. The platform may be commercially attractive because it addresses high-need oncology indications where new mechanisms of action are valuable for patients who relapse or fail standard therapies. The global oncology drugs market was estimated at \$190 billion in 2023 and is projected to reach \$549 billion by 2033, representing a projected compound annual growth rate (CAGR) of about 10.5%.
License: N/A
- 2. U.S. Patent Application Number:** 19/468,933
UKRFID: 2962
Filed: February 3, 2026
Title: SPECIMEN MOUNT FOR SMALL CYLINDERS
Inventors: Martha Grady, Ella Tomko, Floyd Taylor and William Anderson (Pigman College of Engineering)
Description and Application: This invention is a specimen mount for holding small cylindrical samples, such as dental implants, horizontally during processing or electron microscopy imaging. The mount uses an upright clip and spaced tab support to provide stable two-point engagement with minimal surface contact, reducing vibration that can blur images while preserving the sample surface for later testing. Key advantages include improved imaging stability, reduced risk of damaging or contaminating the specimen surface, compatibility with small

cylinders of varying sizes, and utility in quality control and failure analysis where precise surface characterization is important. The technology is particularly relevant to electron microscopy sample preparation workflows used in dental implant manufacturing, materials science, life sciences and industrial inspection. The global electron microscopy and sample preparation market was estimated at \$2.2 billion in 2021 and is projected to reach \$3.5 billion by 2026 at a 9.5% CAGR.
License: N/A

3. **U.S. Patent Application Number:** 19/514,648
UKRFID: 2805
Filed: February 26, 2026
Title: MULTI-DIMENSIONAL NANO PARTICLES
Inventors: Younsoo Bae (College of Pharmacy) and Piotr Rychahou (College of Medicine)
Description and Application: This invention covers quaternary multi-dimensional nanoparticles designed to improve delivery of therapeutic agents by entrapping small-molecule drugs in cyclodextrin inclusion complexes within a protected nanoparticle core. The platform combines cyclodextrins, biocompatible polymers, polyion stabilization and optional targeting agents to support delivery of hydrophobic or hydrophilic drugs, including oncology drugs such as SN-38, carfilzomib, fluorouracil, oxaliplatin, doxorubicin, gemcitabine, cisplatin, carboplatin, paclitaxel and docetaxel. Key advantages include improved drug encapsulation, compatibility with multiple drug classes, potential targeted delivery through surface-conjugated ligands, and a biocompatible shell designed to protect and stabilize the therapeutic payload. The technology is positioned within the growing nanomedicine and nanoparticle drug-delivery markets, with the global nanomedicine market projected to reach \$410.2 billion by 2030 at an approximately 11.6% CAGR.
License: N/A
4. **U.S. Patent Application Number:** 19/557,947
UKRFID: 2975
Filed: March 3, 2026
Title: HYDROPHILIC NANOFILTRATION/ULTRAFILTRATION MEMBRANE AS A CO₂ ABSORBER FOR AIR CAPTURE
Inventors: Kunlei Liu, Xin Gao, Ayokunle Omosebi and Jinwen Wang (Pigman College of Engineering)
Description and Application: This invention is a direct air capture system that uses a hydrophilic nanofiltration/ultrafiltration membrane as the CO₂ absorber, paired with an electrochemical regenerator to release captured CO₂ and regenerate the potassium hydroxide absorbent. Unlike conventional packed-bed absorbers or hydrophobic membrane contactors, the hydrophilic membrane is designed to avoid wetting problems, create nano-scale liquid droplets, increase gas-liquid contact surface area, and selectively separate hydroxide and carbonate ions to improve mass transfer and reduce energy demand. Key advantages include high CO₂ capture efficiency, reported at over 90% at cubic-feet-per-minute

air-flow scale, reduced operational complexity, lower regeneration energy through electrochemical solvent recovery, and potential applicability to scalable direct air capture systems. The global direct air capture market is projected to reach approximately \$1.7 billion by 2030, representing a projected CAGR of about 61%.
License: N/A

5. U.S. Patent Application Number: 19/559,331

UKRFID: 3025

Filed: March 6, 2026

Title: MULTI-CHANNEL INTRACAVITARY APPLICATOR FOR RADIATION ONCOLOGY

Inventors: Ali Soleimani-Meigooni, Ellis Johnson and Denise Fabian (College of Medicine)

Description and Application: This invention is a multi-channel intracavitary applicator for radiation oncology, designed for brachytherapy treatment of gynecologic cancers such as vaginal, cervical, uterine and endometrial cancers. The applicator uses multiple internal curved channels that do not converge toward a common point, enabling more uniform radiation delivery at the vaginal cuff while reducing anisotropy and under-dosing seen with traditional single-channel applicators. Key advantages include improved dose homogeneity, potential reduction in applicator diameter for greater patient comfort, adaptability across different patient anatomies, and compatibility with existing brachytherapy workflows using radiation sources, after loaders, imaging and treatment-planning software. The global brachytherapy market is projected to reach \$2 billion by 2033 at a 7.4% CAGR.

License: N/A

6. U.S. Patent Application Number: 19/559,405

UKRFID: 3027

Filed: March 6, 2026

Title: INTRACAVITARY APPLICATORS FOR RADIATION ONCOLOGY

Inventors: Ali Soleimani-Meigooni, Ellis Johnson and Denise Fabian (College of Medicine)

Description and Application: This invention is a dual-arm tandem intracavitary applicator for radiation oncology, designed to improve brachytherapy treatment for gynecologic cancers, particularly inoperable endometrial cancer where accurate dosing of the uterus is critical. The applicator includes two radiation-delivery arms with multi-planar curvature that better accounts for uterine ante flexion and anteversion, helping the applicator conform more closely to patient anatomy than traditional Y-tandem applicators. Key advantages include improved dose distribution to the uterine cornua and anteriorly reflected portions of the uterus, longer and adjustable tandem geometries for different anatomies, reduced risk of arm collapse or mispositioning, and optional guide/ring features that may also support cervical dosing. The global brachytherapy market is projected to reach \$2 billion by 2033, growing at a 7.4% CAGR.

License: N/A

7. **U.S. Patent Application Number:** 19/599,436
UKRFID: 3028
Filed: March 6, 2026
Title: INTRACAVITARY APPLICATORS, ASSEMBLIES, AND KITS FOR RADIATION ONCOLOGY TREATMENT
Inventors: Ali Soleimani-Meigooni, Ellis Johnson and Denise Fabian (College of Medicine)
Description and Application: This invention is a modular intracavitary applicator system for radiation oncology, designed to improve brachytherapy treatment for gynecologic cancers such as cervical, uterine, vaginal, and endometrial cancer. The technology uses removable applicator bodies that can be selectively secured to radiation-source conduits and can also include angled lateral channels to guide brachytherapy needles into target areas that may otherwise be underdosed. Key advantages include compatibility with existing brachytherapy conduits, customizable applicator geometries for different patient anatomies and tumor shapes, improved ability to treat asymmetric or bulky disease, and potential cost and workflow benefits by allowing multiple applicator bodies to be used with a single conduit system. The global brachytherapy market is projected to reach \$2 billion by 2033, growing at a 7.4% CAGR.
License: N/A
8. **U.S. Patent Application Number:** 19/559,494
UKRFID: 3010
Filed: March 6, 2026
Title: TEMPERATURE OSCILLATION DEVICE FOR PHYSIOLOGICALLY RELEVANT CELL CULTURE SYSTEMS
Inventors: Elizabeth Stumpf and Brian Delisle (College of Medicine)
Description and Application: This invention is a temperature oscillation overlay device that can be removably added to existing tissue culture incubators to create programmable, physiologically relevant temperature cycles for cell culture studies. The device uses independent temperature sensors, microcontroller, internal heating element, and programmable waveform engine to superimpose circadian, fever, hypothermic or other biologically relevant temperature profiles without permanently modifying the incubator. Key advantages include better simulation of in vivo temperature rhythms, improved circadian gene-expression entrainment compared to serum shock, reduced experimental variability, compatibility with existing incubator infrastructure and potential use across chronobiology, drug development, organoid/tissue engineering, fever modeling and metabolic research. The technology is positioned within the broader cell culture and laboratory incubator markets, with the global cell culture market projected to reach \$49.3 billion by 2033 at a 12.9% CAGR, while the global CO₂ incubator market estimated at \$724.9 million in 2023 with a projected 6.3% CAGR until 2030.
License: N/A

9. **U.S. Patent Application Number:** 19/570,501
UKRFID: 3037
Filed: March 18, 2026
Title: ULTRASONIC ASSISTED ADDITIVE FRICTION STIR DEPOSITION
Inventors: James Caudill, Ibrahim Jawahir and Manpreet Singh (Pigman College of Engineering)
Description and Application: This invention is an ultrasonic-assisted additive friction stir deposition system that integrates ultrasonic vibration into a solid-state metal additive manufacturing process. The technology uses a sonotrode-based ultrasonic horn assembly to superimpose ultrasonic energy onto the rotating deposition tool, improving material flow, creating more uniform temperature distribution, reducing axial forces and enabling deposition of high-strength or high-melting-temperature materials that are difficult to process with conventional additive friction stir deposition. Key advantages include improved deposition quality, enhanced plastic deformation without melting, better compatibility with challenging alloys, and potential use in aerospace, defense, automotive and advanced manufacturing applications where high-performance metal parts are needed. The global additive manufacturing market was estimated at \$30.6 billion in 2025 and is projected to reach \$168.9 billion by 2033 at a 23.9% CAGR.
License: N/A
10. **U.S. Patent Application Number:** 19/570,549
UKRFID: 3038
Filed: March 18, 2026
Title: TOOLING FOR ADDITIVE FRICTION STIR DEPOSITION
Inventors: James Caudill, Ibrahim Jawahir, Sarvesha Rajashekara and Nimesh Fernando (Pigman College of Engineering)
Description and Application: This invention is a specialized tooling design for additive friction stir deposition, a solid-state metal 3D printing process that builds metal or composite parts without melting the material. The tool uses spiral or vortex-shaped protrusions, and alternative radial convexity patterns, on the tool face to smear, shear and mix deposited feedstock more effectively during layer-by-layer deposition. Key advantages include improved material flow, more uniform strain and temperature distribution, enhanced reinforcement dispersion in metal matrix composites, refined microstructures, reduced mechanical resistance during deposition, and stronger as-deposited parts with fewer fusion-related defects such as porosity, cracking and residual stress. The global additive manufacturing market was estimated at \$30.6 billion in 2025 and is projected to reach \$168.9 billion by 2033 at a 23.9% CAGR.
License: N/A

- 11. U.S. Patent Application Number:** 19/570,711
UKRFID: 3039
Filed: March 18, 2026
Title: METHOD OF PRODUCING A BORON NITRIDE NANOTUBE-REINFORCED METAL MATRIX COMPOSITE COMPONENT
Inventors: James Caudill and Sarvesha Rajashekara (Pigman College of Engineering)
Description and Application: This invention is a solid-state additive manufacturing method for producing boron nitride nanotube-reinforced metal matrix composite components. The process disperses BNNTs into a metallic feedstock and uses additive friction stir deposition to apply severe plastic deformation and shear-induced material flow, embedding and redistributing the nanotubes through the metal matrix without melting the material. Key advantages include improved BNNT dispersion compared to conventional powder metallurgy, casting or spray deposition; preservation of nanotube structure through lower-temperature processing; refined grain structure through dynamic recrystallization; and production of lightweight, high-strength composites for aerospace, automotive, defense and other advanced manufacturing applications. The global additive manufacturing market was estimated at \$30.6 billion in 2025 and is projected to reach \$168.9 billion by 2033 at a 23.9% CAGR.
License: N/A
- 12. U.S. Patent Application Number:** 19/523,023
UKRFID: 2665
Filed: March 25, 2026
Title: CATALYTIC DECARBOXYLATION/DECARBONYLATION OF LEAGINOUS FEEDS INCLUDING ROSIN ACIDS TO SUSTAINABLE AVIATION FUEL BLENDSTOCK
Inventors: Eduardo Santillan-Jimenez, Robert Pace and Chukwudalu Umenweke (Center for Applied Energy Research)
Description and Application: This invention is a catalytic process to convert low-quality fats, oils, greases, tall oil, algae oil and rosin-containing feedstocks into hydrocarbons suitable for sustainable aviation fuel blendstock. The technology uses supported metal catalysts, including nickel-copper catalysts on SAPO-11, to drive decarboxylation/decarbonylation reactions that can produce alkanes, iso-alkanes, cycloalkanes and aromatics while using lower hydrogen requirements than conventional hydrodeoxygenation approaches. Key advantages include the ability to use low-cost waste or non-edible feedstocks, potential production of drop-in SAF components with improved cold-flow and seal-swelling properties, catalyst regeneration and demonstrated quantitative conversion of distilled tall oil with a substantial portion of products in the jet-fuel boiling range. The global sustainable aviation fuel market is projected to reach \$15.9 billion by 2030, growing at a projected 57.5% CAGR.
License: N/A

- 13. U.S. Patent Application Number:** 19/634,568
UKRFID: 2999
Filed: March 31, 2026
Title: VERAGUAMIDE COMPOUNDS
Inventors: Kevin Tidgwell, Chhabi Chaudhary (College of Pharmacy) and Benedict Kolber (University of Texas at Dallas)
Description and Application: This invention covers veraguamide compounds and analogs, including derivatives where ester linkages are replaced with amide linkages, for potential use as non-opioid therapeutics for pain. The compounds are designed to interact with the sigma-2/TMEM97 receptor and modulate pathways associated with store-operated calcium entry, nociceptor inhibition and the integrated stress response, with early data showing analgesic-like effects in human nociceptor-like cells and reduced eIF2 α phosphorylation without significant cytotoxicity in HEK-293 cells. Key advantages include a potential non-opioid mechanism for chronic, neuropathic and inflammatory pain; synthetic analog flexibility; receptor-targeted activity; and possible use alongside other anesthetic or analgesic adjuvants. The technology is positioned within the global pain management drugs and neuropathic pain markets, with the pain management drugs market projected to reach \$115.9 billion by 2033 at a 4.38% CAGR.
License: N/A
- 14. International Application Number:** PCT/US2026/018165
UKRFID: 2908
Filed: March 6, 2026
Title: DIHYDRO PYRAZOLO PYRIDINONE MYC INHIBITORS FOR CANCER TREATMENT
Inventors: Samuel Awuah, Samuel Ofori and Oluwatosin Obisesan (College of Arts and Sciences)
Description and Application: This invention covers a new class of dihydro pyrazolo pyridinone small-molecule inhibitors designed to target c-MYC, a major cancer-driving transcription factor implicated in tumor growth, cell proliferation and cancer progression. The compounds are intended to bind MYC, disrupt MYC–MAX heterodimerization, reduce active MYC signaling, promote MYC degradation and inhibit growth of MYC-driven cancer cells, with MY05 highlighted as a lead compound showing MYC target engagement, reduced tumor growth and tolerability in a mouse breast cancer model. Key advantages include direct targeting of a historically difficult “undruggable” oncology target, small-molecule drug potential, activity against MYC-driven tumors and applicability across cancers where MYC dysregulation is a major driver. The global oncology drugs market is projected to reach \$564.5 billion by 2033, with a projected 11.5% CAGR.
License: N/A

Patent Activities
Fiscal Year to Date as of March 31, 2026

Total FY2025-26					
	FY26Q1	FY26Q2	FY26Q3	FY26Q4	Total FY26
Invention Disclosures ⁱ	42	26	36	0	104
Full Patent Applications ⁱⁱ	20	13 ¹	14	0	47
Provisional Patent Applications ⁱⁱⁱ	29	19	31	0	79
Patents Issued	12	12	7	0	31
License Income	\$551,786.05	\$522,581.31	\$611,929.82	\$0	\$1,686,297.18
New Licenses and Options Executed	9	9	10	0	28
New UK Startups Formed	0	0	0	0	0

¹ Capture of licensee filed patent application.

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			
Younsoo Bae and Piotr Rychahou	College of Pharmacy	Multi-dimensional nano particles	A quaternary multi-dimensional nanoparticles designed to improve delivery of oncology drugs.
Ali Soleimani-Meigooni, Ellis Johnson and Denise Fabian	College of Medicine	Multi-channel intracavitary applicator for radiation oncology	A multi-channel intracavitary applicator for radiation oncology.
Ali Soleimani-Meigooni, Ellis Johnson and Denise	College of Medicine	Intracavitary applicators for radiation oncology.	A dual-arm tandem intracavitary applicator for radiation oncology.
Ali Soleimani-Meigooni, Ellis Johnson, and Denise Fabian	College of Medicine	Intracavitary applicators, assemblies, and kits for radiation oncology treatment	A modular intracavitary applicator system for radiation oncology.
Elizabeth Stumpf and Brian Delisle	College of Medicine	Temperature oscillation device for physiologically relevant cell culture systems	A temperature oscillation overlay device that can be removably added to existing tissue culture incubators.
Kevin Tidgwell, Chhabi Chaudhary and Benedict Kolber	College of Pharmacy	Veraguamide compounds	Veraguamide compounds and analogs, including derivatives where ester linkages are replaced with amide linkages, for potential use as non-opioid therapeutics for pain.

Inventors	College(s)	Title	Brief description
Engineering			
Martha Grady, Ella Tomko, Floyd Taylor and William Anderson	Pigman College of Engineering	Specimen mount for small cylinders	A specimen mount for holding small cylindrical samples like dental implants.
Kunlei Liu, Xin Gao, Ayokunle Omosibi and Jinwen Wang	Pigman College of Engineering	Hydrophilic nanofiltration/ultrafiltration membrane as a CO ₂ absorber for air capture	A direct air capture system that uses a hydrophilic nanofiltration/ultrafiltration membrane as the CO ₂ absorber for better efficiency.
James Caudill, Ibrahim Jawahir and Manpreet Singh	Pigman College of Engineering	Ultrasonic assisted additive friction stir deposition	An ultrasonic-assisted additive friction stir deposition system that integrates ultrasonic vibration into a solid-state metal additive manufacturing process.
James Caudill, Ibrahim Jawahir, Sarvesha Rajashekara and Nimesh Fernando	Pigman College of Engineering	Tooling for additive friction stir deposition	A specialized tooling design for additive friction stir deposition with improved material flow and reduce mechanical resistance.
James Caudill and Sarvesha Rajashekara	Pigman College of Engineering	Method of producing a boron nitride nanotube-reinforced metal matrix composite component	A solid-state additive manufacturing method for producing boron nitride nanotube-reinforced metal matrix composite components with improved material flow and reduce mechanical resistance.

Inventors	College(s)	Title	Brief description
Center for Applied Energy Research			
Eduardo Santillan-Jimenez, Robert Pace and Chukwudalu Umenweke	Center for Applied Energy Research	Catalytic decarboxylation/ decarbonylation of oleaginous feeds including rosin acids to sustainable aviation fuel blendstock	A catalytic process for converting low-quality fats, oils, greases, tall oil, algae oil and rosin-containing feedstocks into hydrocarbons.
College of Arts and Sciences			
Samuel Awuah, Sailajah Gukathanan and Chibuzor Olelewe	College of Arts and Sciences	Compounds containing organometallic stabilized gold (III) macrocycles	A new class of organometallic-stabilized gold(III) macrocycle compounds designed as anti-cancer agents.
Samuel Awuah, Samuel Ofori and Oluwatosin Obisesan	College of Arts and Sciences	Dihydro pyrazolo pyridinone myc inhibitors for cancer treatment	A new class of small-molecule inhibitors designed to target c-MYC, a major cancer-driving transcription factor implicated in tumor growth.

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.