

FCR 16

Office of the President
December 10, 2019

Members, Board of Trustees:

PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period July 1, 2019 to September 30, 2019.

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, 2019 TO September 30, 2019

Patents

Highlight of New PCT Reporting as Compared to U.S. National Stage Reporting:

- * **International Application Number:** PCT/US2010/602523
Filed: December 30, 2010
Title: SYSTEM, DEVICE, AND METHOD FOR DETERMINATION OF INTRAOCULAR PRESSURE
Inventors: E. Britt Brockman; Jeffrey T. Hastings
Description and Application: The researchers developed a system, device, and method for measuring intraocular pressure. The invention includes an intraocular pressure sensor, a light source illuminating the intraocular pressure sensor with one or more wavelengths of light, and a detector that measures reflected and/or emitted light from the sensor. Ophthalmologists use traditional devices to measure IOP in a physician's office. Implantable electronic devices for more frequent measurement of intraocular pressure are also known. The shortcomings of these prior art devices and methods are overcome by the new innovation.

- * **U.S. Patent Application Serial Number:** 16/058,361
Filed: August 8, 2018
Title: System, device, and method for determination of intraocular pressure (UKID 1682)
Inventors: E. Britt Brockman; Jeffrey T. Hastings
Description and Application: The researchers developed a system, device, and method for measuring intraocular pressure. The invention includes an intraocular pressure sensor, a light source illuminating the intraocular pressure sensor with one or more wavelengths of light, and a detector that measures reflected and/or emitted light from the sensor. Ophthalmologists use traditional devices to measure IOP in a physician's office. Implantable electronic devices for more frequent measurement of intraocular pressure are also known. The shortcomings of these prior art devices and methods are overcome by the new innovation.

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 Serial Number: 16/458,611**
Filed: July 1, 2019
Title: PROCESS AND MATERIALS FOR AN ELECTROCHEMICAL CELL TO ABSORB AND DECOMPOSE ORGANIC NITROSAMINE COMPOUNDS FROM WATER STREAMS (UKID2231)
Inventors: Jesse G. Thompson; Kunlei Liu; James Landon; Xin Gao (CAER)
Description and Application: University of Kentucky researchers developed a method of effectively, actively, and continuously remove nitrosamines that accumulate in the water section of a CCS before emission into the atmosphere. This innovation can be used in Amine-based post-combustion CCS used for separation of CO₂ from industrial flue gases.
- 2. U.S. Patent Application Serial Number: 16/460,229**
Filed: July 1, 2019
Title: REPOSITIONING OF FLUBENDAZOLE AND RELATED COMPOUNDS FOR TREATING PARALYSIS AFTER TRAUMATIC SPINAL CORD INJURY (UKID2234)
Inventors: Chen-Guang Yu; James W. Geddes (College of Medicine/ Spinal Cord and Brain Injury Research)
Description and Application: The administration of Flubendazole, or similar benzimidazole drugs, to attenuate secondary injury mechanisms and improve locomotor function following spinal cord injuries. Of the 17,000 cases of spinal cord injury in the United States, less than 1% are discharged from the hospital with full neurological recovery. The accidental or silent onset of spinal cord injury results in cascades of secondary injury responses which exacerbate pathological and functional deficits. These secondary injury cascades serve as a potential therapeutic target to ameliorate deficits following injury.
- 3. U.S. Patent Application Serial Number: 16/460,229**
Filed: July 2, 2019
Title: RECIRCULATING WATER WASH RECOVERY COLUMN WITH ACTIVE CARBON PARTICLES FOR REMOVING ENTRAINED SOLVENT IN PROCESS EMISSIONS (UKID2239)
Inventors: Bradley D Irvin; Kunlei Liu; Leland Widger; Amanda Warriner (Center for Applied Energy Research)
Description and Application: Introduction and circulation of activated carbon particles into a water wash column. The carbon particles act as a nucleation sites for amine solvent droplets entrained in process exhaust. This has been shown to improve solvent recovery in a CCS process by 60%.

- 4. U.S. Patent Application Serial Number: 16/514,276**
Filed: July 17, 2019
Title: N,N'-DIARYL-BISHYDRAZONES IN A BIPHENYL PLATFORM: BROAD SPECTRUM ANTIFUNGAL AGENTS (UKID2275)
Inventors: Sylvie Garneau-Tsodikova; David S. Watt; Nishad Thamban Chandrika (College of Pharmacy/Pharmaceutical Sciences)
Description and Application: Researchers at the University of Kentucky identified N,N'-Diaryl-Bishydrazones as a novel antifungal agents with favorable pharmacokinetic profiles.. The global antifungal drugs market size was valued at USD 12.5 billion in 2016 and is expected to experience tremendous growth. As the number of hospitalized patients continue to rise, fungal infections are also spreading at an escalating rate. Drugs for systemic antifungal treatment are available via intravenous or oral administration.

- 5. U.S. Patent Application Serial Number: 16/518,736**
Filed: July 22, 2019
Title: A NEW DUAL-ACTION MEDICATION TO CAUSE DOUBLE-TROUBLE FOR TUBERCULOSIS (UKID2289)
Inventors: Sylvie Garneau-Tsodikova; Nicole Neeltje van der Wel (College of Pharmacy/Pharmaceutical Sciences)
Description and Application: Researchers at the University of Kentucky developed a new dual-action medication to cause double-trouble for tuberculosis (Eis inhibitor) that works by inhibiting DNA acetylation during stress-induced DNA condensation (after antibiotic treatment). Approximately 1/3 of the world's population is living with latent TB (people who are infected with mycobacterium and have a 10% risk to fall ill with TB). The average number of pills necessary to treat one person's TB is 14,600. According to the CDC, the average cost of TB treatment for a single case ranges from \$17,000 (non-MDR TB) to \$430,000 (XDR TB).

- 6. International Application Number: PCT/US19/45350**
Filed: August 6, 2019
Title: PROTEASOME INHIBITORS WITH CYCLIC PEPTIDE BACKBONES (UKID2296)
Inventors: Kyung Bo Kim; Zachary Miller; Min Jae Lee; Deepak Bhattarai (College of Pharmacy/Pharmaceutical Sciences)
Description and Application: Researchers at the University of Kentucky developed a class of peptide epoxyketones containing cyclic peptide backbones that selectively inhibit the immunoproteasome and ameliorate the progression of neurodegenerative diseases, such as AD and AMD. Unlike currently-available proteasome inhibitors, these compounds are relatively resistant to peptidases and are therefore more metabolically stable. Preliminary

data indicate that immunoproteasome inhibitors improve function of mouse models of these diseases, but currently-available inhibitors are quickly degraded by peptidases. Therefore, there is an opportunity for the development of immunoproteasome inhibitors with enhanced stability as therapies for AD and ADM.

- 7. U.S. Patent Application Serial Number:** 16/533,395
Filed: August 6, 2019
Title: A SELF-CLEANING, NON-CLOGGING, WATER-FLOODED IMPINGEMENT SCREEN FOR DUST-CONTROL (UKID2274)
Inventors: Steven Schafrik; Ashish Ranjan Kumar; William Chad Wedding; Oscar Velasquez (College of Engineering/ Mining Engineering)
Description and Application: Researchers in the University of Kentucky's Department of Mining Engineering are developing a self-cleaning, non-clogging, water-flooded impingement screen for use in mining operations. The nature of the screen system is such that air is forced through a series of screens at high velocity. Since most mining operations take place underground in confined spaces with poor air circulation, a properly functioning dust screen is crucial to prevent workers from inhaling harmful dust particles. Oftentimes, the conventional fibrous dust screens get clogged with dust. When the screens get clogged, the mining operation must be shut down while the screen is cleaned. This continuous interruption of the mining operation limits the efficiency of mining operations.
- 8. U.S. Patent Application Serial Number:** 16/551,202
Filed: August 26, 2019
Title: DETECTION OF REACTIVE OXYGEN SUBSTANCES IN FOODS AND PHARMACEUTICALS USING CHEMICAL LUMINESCENCE FROM INORGANIC CRYSTALLINE MATERIALS (UKID2147)
Inventors: William L. Boatright (College of Agriculture, Food and Environment/Animal and Food Sciences)
Description and Application: University of Kentucky researchers have developed a new structured compound semiconductor material that generates chemically-stimulated luminescence upon exposure to organic free radicals and ROS. This technology could be useful in rancidity detection in the food and pharmaceutical industries. The technology could also be used in the visualization of free radicals in biological samples.
- 9. U.S. Patent Application Serial Number:** 16/557,777
Filed: August 30, 2019
Title: ORDERED NANOTUBES ON TWO-DIMENSIONAL SUBSTRATE CONSISTING OF DIFFERENT MATERIAL (UKID2298)
Inventors: Douglas R. Strachan; Mathias J. Boland; Mohsen Nasser (College of Arts & Sciences/Physics and Astronomy).

Description and Application: Researchers in the University of Kentucky's Department of Physics and Astronomy are developing a method of growing ordered nanotube arrays on a high-quality, hexagonal Boron Nitride (hBN) substrate. The hBN support can control the orientation of the carbon nanotubes, an important characteristic for growing parallel arrays of the nanotubes. Additionally, the nanotubes and hBN support have different electrical characteristics, opening the possibility of designing microcircuits with this technology. The hBN acts as an insulator, preserving the electrical characteristics of the embedded nanotubes. The hBN support can also be catalytically etched, providing a track along which the nanotubes can be grown.

10. International Application Number: PCT/US19/51985

Filed: September 18, 2019

Title: INHIBITION OF ALPHA5BETA1 INTEGRIN WITH ATN-161 AS A NOVEL THERAPY FOR VASCULAR DEMENTIA (UKID2280)

Inventors: Gregory J. Bix; Jill M. Roberts (College of Medicine/Neurology)

Description and Application: Researchers at the University of Kentucky developed a novel therapy for vascular dementia (ATN-161) that works by inhibiting the $\alpha 5\beta 1$ integrin in order to stabilize the blood brain barrier, decrease inflammation, and improve cognitive function. Vascular Dementia is the second leading cause of dementia after Alzheimer's Disease. It is a chronic, life-long condition caused by inadequate blood supply to the brain (e.g. after stroke). Current vascular dementia therapy largely focuses on prevention of future strokes through controlling or avoiding conditions and diseases which increase the risk of stroke.

11. International Application Number: PCT/US19/52118

Filed: September 20, 2019

Title: Novel mithramycin derivatives for cancer chemotherapy (UKID2198)

Inventors: Jurgen Rohr; Markos Leggas; Oleg V. Tsodikov (College of Pharmacy/Pharmaceutical Sciences)

Description and Application: UK Researchers developed various mithramycin SA derivatives that were synthesized from a mithramycin SA producing mutant. The derivatives of particular interest are those containing the dipeptides L-Phe and L-Trp. Ewing Sarcoma is a rare bone cancer that affects approximately 200 children and young adults every year. Current therapies involve chemotherapy and radiation to shrink and eradicate the tumor, however, there are several side effects and these therapies can destroy healthy cells as well as cancerous cells.

Patent Activities
Fiscal Year to date as of September 30 2019

	Q1 FY 2019	Total FY 2019	Q1 FY 2020	Total FY 2020
Full Patent Applications	7	28	11	11
Provisional Patent Applications	10	66	28	28
Patents Issued	02	26	7	7
License Income	\$1,176,827.69	\$2,327,052.74	\$ 1,365,221.64	\$1,365,221.64

Patent Application Summary Table

Inventors	College(s)	Title	Brief description
Biomedical			
Chen-Guang Yu; James W. Geddes	College of Medicine/ Spinal Cord and Brain Injury Research	Repositioning of flubendazole and related compounds for treating paralysis after traumatic spinal cord injury. (UKID2234)	The administration of Flubendazole, or similar benzimidazole drugs, to attenuate secondary injury mechanisms and improve locomotor function following spinal cord injuries.

<p>Kyung Bo Kim; Zachary Miller; Min Jae Lee; Deepak Bhattarai</p>	<p>College of Pharmacy/Pharmaceutical Sciences</p>	<p>N,N'-Diaryl- Bishydrazones in a Biphenyl Platform: Broad Spectrum Antifungal Agents. (UKID2275)</p>	<p>N,N'-Diaryl- Bishydrazones as a novel antifungal agents with favorable pharmacokinetic profiles.</p>
<p>Sylvie Garneau- Tsodikova; Nicole Neeltje van der Wel</p>	<p>College of Pharmacy/Pharmaceutical Sciences</p>	<p>A new dual- action medication to cause double- trouble for Tuberculosis. (UKID2289)</p>	<p>Developed a new dual-action medication to cause double-trouble for tuberculosis (Eis inhibitor) that works by inhibiting DNA acetylation during stress-induced DNA condensation (after antibiotic treatment).</p>
<p>Kyung Bo Kim; Zachary Miller; Min Jae Lee; Deepak Bhattarai</p>	<p>College of Pharmacy/Pharmaceutical Sciences</p>	<p>Proteasome inhibitors with cyclic peptide backbones. (UKID2296)</p>	<p>Developed a class of peptide epoxyketones containing cyclic peptide backbones that selectively inhibit the immunoproteasome and ameliorate the progression of neurodegenerative diseases, such as AD and AMD.</p>
<p>Gregory J. Bix; Jill M Roberts</p>	<p>College of Medicine/Neurology</p>	<p>Inhibition of alpha5beta1 integrin with ATN-161 as a novel therapy for vascular dementia. (UKID2280)</p>	<p>Developed a novel therapy for vascular dementia (ATN- 161) that works by inhibiting the $\alpha\beta 1$ integrin in order to stabilize the blood brain barrier, decrease inflammation, and improve cognitive function.</p>

Jurgen Rohr; Markos Leggas; Oleg V. Tsodikov	College of Pharmacy/Pharmaceutical Sciences	Novel mithramycin derivates for cancer chemotherapy. (UKID2198)	UK Researchers developed various mithramycin SA derivatives that were synthesized from a mithramycin SA producing mutant. The derivatives of particular interest are those containing the dipeptides L-Phe and L-Trp.
Engineering			
Jesse G. Thompson; Kunlei Liu; James Landon; Xin Gao new nomenclature	Center for Applied Energy Research	Process and materials for an electrochemical cell to absorb and decompose organic nitrosamine compounds from water streams. (UK2231)	Developed a method of effectively, actively, and continuously remove nitrosamines that accumulate in the water section of a CCS before emission into the atmosphere
Bradley D Irvin; Kunlei Liu; Leland Widger; Amanda Warriner	Center for Applied Energy Research	Recirculating water wash recovery column with active carbon particles for removing entrained solvent in process emissions. (IUKID2239)	Introduction and circulation of activated carbon particles into a water wash column. The carbon particles act as a nucleation sites for amine solvent droplets entrained in process exhaust. This has been shown to improve solvent recovery in a CCS process by 60%.

Steven Schafrik; Ashish Ranjan Kumar; William Chad Wedding; Oscar Velasquez	College of Engineering/ Mining Engineering	A self-cleaning, non-clogging, water-flooded impingement screen for dust- control. (UKID2274)	Developing a self- cleaning, non- clogging, water- flooded impingement screen for use in mining operations.
William L. Boatright	College of Agriculture, Food and Environment/Animal & Food Sciences	Detection of reactive oxygen substances in foods and pharmaceuticals using chemical luminescence from inorganic crystalline materials. (UKID2147)	Developed a new structured compound semiconductor material that generates chemically- stimulated luminescence upon exposure to organic free radicals and ROS
Douglas R. Strachan; Mathias J. Boland; Mohsen Nasseri	College of Arts and Sciences/Physics and Astronomy	Ordered Nanotubes on Two-Dimensional Substrate Consisting of Different Material. (UKID2298)	Developing a method of growing ordered nanotube arrays on a high-quality, hexagonal Boron Nitride substrate.