

# FCR 14

Office of the President  
December 12, 2017

Members, Board of Trustees:

## PATENT ASSIGNMENT REPORT

Recommendation: that the Board of Trustees accept the patent assignment report for the period July 1, 2017 to September 30, 2017.

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 July 1, 2017 TO September 30, 2017

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 Serial Number: 15/642,143**

**Filed:** July 5, 2017

**Title:** Method and System for Identification of Metabolites

**Inventors:** Hunter Moseley, William Carreer, Joshua Mitchell and Robert Flight (College of Medicine)

**Technical Description:** This application relates to methods and systems for identification of an unknown compound, which includes but is not limited to metabolites, detected by mass spectrometry, including ultra-high resolution mass spectrometry. The presently-disclosed subject matter further relates to identification of molecular formulas of detected compounds including metabolites.

**Summary:** This application provides for a method and system using mass spectrometry for identification of a specific elemental formula for an unknown compound which includes but is not limited to a metabolite.

**Application:** Identification of unknown compounds by mass spectrometry

**2. U.S. Patent Application Serial Number: 15/644,677**

**Filed:** July 7, 2017

**Title:** Bishydrazone-Based Antifungal Agents

**Inventors:** David Watt (College of Medicine), Sylvie Garneau-Tsodikova and Stefan Kwiatkowski (College of Pharmacy)

**Technical Description:** This application is directed to antifungal activity and methods for treating or preventing fungal conditions in a subject by administering hydrazone compounds and pharmaceutical compositions including hydrazone.

**Summary:** This application provides hydrazone compounds and pharmaceutical compositions including same having antifungal activity. Such compounds are useful for treating or preventing fungal conditions in a subject in need thereof by administering same.

**Application:** Treatment of fungal conditions

**3. U.S. Patent Application Serial Number: 15/543,821**

**Filed:** July 14, 2017

**Title:** Lipid Bilayer-Integrated SPP1 Connector Protein Nanopore and SPP1 Connector Protein Variants for Use as Lipid Bilayer-Integrated Nanopore

**Inventors:** Peixuan Guo and Shaoying Wang (formerly College of Pharmacy)

**Technical Description:** This application relates to engineered SPP1 viral DNA-packaging motor connector protein that can be incorporated into a lipid membrane to form an electroconductive aperture.

**Summary:** This application provides a conductive channel-containing membrane which includes a membrane layer and a SPP1 connector polypeptide variant that is incorporated

into the membrane layer to form an aperture through which conductance can occur when an electrical potential is applied across the membrane. A method of sensing a molecule, such as a polypeptide or nucleic acid molecule, makes use of the conductive channel-containing membrane. A method of DNA sequence makes use of the conductive channel-containing membrane.

**Application:** DNA sequencing

**4. U.S. Patent Application Serial Number: 15/653,126**

**Filed:** July 18, 2017

**Title:** Polyborosiloxane Binders

**Inventors:** Susan Odom, Darius Shariaty, and Yang-Tse Cheng (College of Arts and Sciences)

**Technical Description:** This application generally relates to polymer binders and their use in electrodes. In particular, certain embodiments of the presently-disclosed subject matter relate to polyborosiloxane binders for use with silicon in electrodes of rechargeable batteries.

**Summary:** This application provides electrodes for rechargeable batteries that include silicon and a binder.

**Application:** Polymer binders for use in rechargeable batteries

**5. U.S. Patent Application Serial Number: 15/654,464**

**Filed:** July 19, 2017

**Title:** 1,9,10-Substituted Phenothiazine Derivatives with Strained Radical Cations and Use Thereof

**Inventors:** Susan Odom, Chad Risko, Matthew Casselman, Corrine Elliott, Harsha Attanayake, and Subrahmanyam Modekrutti (College of Arts and Sciences)

**Technical Description:** This application relates to substituted phenothiazine derivatives that contain substituents at the 1,10 position or at the 1,9,10 position that raise oxidation potentials of whether the substituent is electron-donating or electron withdrawing, without necessarily concomitantly raising reduction potentials.

**Summary:** This application provides phenothiazine derivatives which can be used in rechargeable batteries to confer overcharge protection in such batteries.

**Application:** Overcharge protection for rechargeable batteries

**6. U.S. Patent Application Serial Number: 15/655,988**

**Filed:** July 21, 2017

**Title:** Compact Low-Cost Fiberless Diffuse Speckle Contrast Flow-oximeter

**Inventors:** Todd Hastings (College of Engineering), Guoqiang Yu and Chong Huang (College of Medicine)

**Technical Description:** This application generally relates to a device for noninvasively measuring tissue blood flow and oxygenation, and more particularly, to a compact fiberless diffuse speckle contrast flow-oximeter for measuring blood flow and oxygenation at relatively deep tissues below skin level.

**Summary:** This application provides a low-cost compact fiberless diffuse speckle contrast flow-oximeter.

**Application:** Noninvasive measurement of tissue blood flow and oxygenation

- 7. U.S. Patent Application Serial Number: 15/552,441**  
**Filed:** August 21, 2017  
**Title:** Nucleosides for Retinal Degeneration  
**Inventors:** Benjamin Fowler and Jayakrishna Ambati (formerly College of Medicine)  
**Technical Description:** This application relates to compounds, compositions, and methods useful for treating retinal damage and/or retinal degradation/retinal degeneration, for inhibiting inflammasome activation by *Alu* RNA associated with a cell, for reducing ATP-induced permeability of a cell, and for reducing an amount of mitochondrial reactive oxygen species in a cell.  
**Summary:** This application provides a method for treating degradation of the retinal pigment epithelium which currently does not have an effective clinical intervention.  
**Application:** Treatment of retinal damage by inhibiting inflammasome activation
- 8. U.S. Patent Application Serial Number: 15/683,679**  
**Filed:** August 25, 2017  
**Title:** Two-Electron Donating Phenothiazine and Use Thereof  
**Inventors:** Susan Odom, Aman Preet, Matthew Casselman, and Harsha Attanayake (College of Arts and Sciences)  
**Technical Description:** The present application generally relates to phenothiazine derivatives. In particular, certain embodiments of phenothiazine derivatives with stable first and second oxidation states and the use thereof for redox flow batteries.  
**Summary:** The present application provides for compounds for use as electrolytes in a non-aqueous redox battery, including an N-substituted phenothiazine compound.  
**Application:** Electrolytes for use as electrodes in non-aqueous redox batteries
- 9. U.S. Patent Application Serial Number: 15/555,822**  
**Filed:** September 5, 2017  
**Title:** MiRNA for Treatment of Breast Cancer  
**Inventors:** Peixuan Guo, Dan Shu, Yi Shu, Hui Li, and Farzin Haque (formerly College of Pharmacy)  
**Technical Description:** This application relates to RNA nanostructure and method to treat breast cancer. More particularly, an RNA nanostructure and composition containing a multiple branched RNA nanoparticle, a breast cancer targeting module, and an effective amount of a breast cancer therapeutic agent. Further, the presently disclosed subject matter relates to a method of using the RNA nanoparticle composition to treat breast cancer in a subject having or at risk of having breast cancer.  
**Summary:** This application discloses RNA-based composition and method to treat breast cancer in a subject.  
**Application:** Treatment of breast cancer
- 10. U.S. Patent Application Serial Number: 15/556,946**  
**Filed:** September 8, 2017  
**Title:** RNA Nanoparticle for the Treatment of Gastric Cancer  
**Inventors:** Peixuan Guo, Chunlei Zhang, Daxiang Cui, Yi Shu and Dan Shu (formerly College of Pharmacy)  
**Technical Description:** This application discloses the use of the thermostable three-way junction (3WJ) of bacteriophage phi29 2 motor pRNA to escort folic acid, an NIR image

marker and BRCAA1 siRNA for targeting, imaging, delivery, gene silencing and regression of gastric cancer in animal models. In vitro assay results revealed that the RNA nanoparticles specifically bind to gastric cancer cells, and knock-down the BRCAA1 gene. Apoptosis of gastric cancer cells was observed.

**Summary:** This application relates to compositions and methods for treatment of gastric cancer, including cancer of the stomach.

**Application:** Treatment of gastric cancer

**11. U.S. Patent Application Serial Number: 15/599,228**

**Filed:** September 18, 2017

**Title:** Spectral Imaging Sensors and Methods with Time of Flight Sensing

**Inventors:** Daniel Lau (College of Engineering) and Gonzalo Arce (University of Delaware)

**Technical Description:** This application discloses spectral imaging sensors and methods. One spectral imaging sensor includes a light source, an array of coded apertures, one or more optical elements, and a photodetector. The light source is configured to emit a plurality of light pulses toward an object to be imaged. The array of coded apertures is positioned to spatially modulate light received from the object to be imaged. The photodetector is positioned to receive light from the one or more optical elements. The photodetector comprises a plurality of light sensing elements. The plurality of light sensing elements are operable to sense the light from the one or more optical elements in a plurality of time periods. The plurality of time periods have a same frequency as the plurality of pulses of light.

**Summary:** This application relates to spectral imaging, and more particularly, to spectral imaging sensors and methods employing time-of-flight sensing which provide 3-D imaging.

**Application:** 3-D virtual reality imaging

**12. U.S. Patent Application Serial Number: 15/708,844**

**Filed:** September 20, 2017

**Title:** Process and Material for Removal of Nitrosamines from Aqueous Systems

**Inventors:** Kunlei Liu, Cameron Lippert, Jesse Thompson, Leland Widger, and Megan Combs (Center for Applied Energy Research)

**Technical Description:** The present application relates to a method and system for removing nitrosamines from amine-based carbon capture systems by circulating waterwash through a filter of activated carbon. Nitrosamine emission control strategies are critical for the success of amine-based carbon capture as the technology approaches industrial-scale deployment. Waterwash systems are used to control volatile and aerosol emissions, including nitrosamines, from carbon capture plants, but it is still necessary to remove or destroy nitrosamines in the circulating waterwash to prevent emissions into the environment. The circulation of the water over a sorbent bed of activated carbon provides a cost-effective approach to selectively remove nitrosamines from the waterwash effluent to reduce the environmental impact associated with amine-based carbon capture.

**Summary:** This application provides a process for active and continuous removal of volatile nitrosamines that accumulate in the waterwash section of a carbon capture system (CCS) before they can be emitted into the atmosphere.

**Application:** Nitrosamine emission control in fossil fuel plants

**13. U.S. Patent Application Serial Number: 15/714,647**

**Filed:** September 25, 2017

**Title:** Cytisine-Linked Isoflavonoid Antineoplastic Agents for the Treatment of Cancer

**Inventors:** Chunming Liu, David Watt, Mykhaylo Frasinuk, Vitaliy Sviripa, Wen Zhang, Svitlana Bondarenko (College of Medicine)

**Technical Description:** This application discloses cytosine-linked isoflavonoids, or pharmaceutically acceptable salts thereof or pharmaceutically acceptable compositions thereof, that are useful for the treatment of conditions in which cells have a reliance on peroxisomal HSD17B4 to degrade very long chain fatty acids and provide necessary energy for cell proliferation, as seen in colorectal cancer and prostate cancer, for example.

**Summary:** This application relates to compounds with antineoplastic activity. In particular, the application is directed to cytosine-linked isoflavonoids and use of such compounds to inhibit cell growth in prostate or colorectal cancer.

**Application:** Treatment of prostate or colorectal cancer

Patent Activities

Fiscal year to date as of September 30, 2017

	Q1	Q2	Q3	Q4	Total
Full Patent Applications	13				13
Provisional Patent Applications	5				5
Patents Issued	5				5
License Income	\$906,686				\$906,686