



Non-Confidential Intellectual Property Portfolio Summary

The Howard University, established in 1867, is one of the premier research universities in the United States. The following is a summary of select inventions in Howard University's portfolio.

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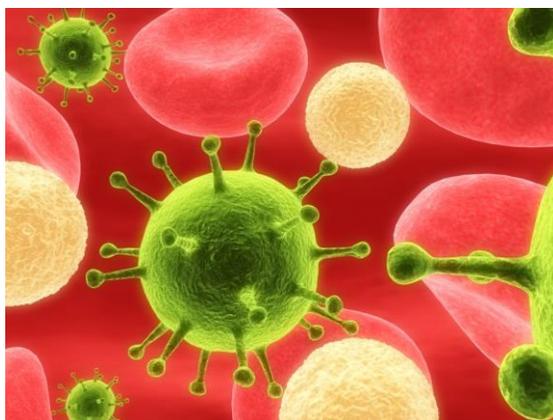
Nanotechnology

<p>Nanotechnology (Drug Delivery Methods)</p>	<p>Akala, Emmanuel; Okunola, Oluyomi;</p>	<p>Degradable and Biodegradable Stealth Nanospheres for Improved Drug Delivery</p>	<p>Description: The invention is a novel method for producing polymer nanoparticles that can remain in the body's circulation for longer periods of time than existing nanoparticle delivery systems. This technology allows for a greater amount of a therapeutic or diagnostic agent to reach targeted tissue and for more consistent dosing. Additionally, these nanoparticles can be modified for active delivery of cancer drugs to solid tumors or specific cell types. This is one of two inventions in the system.</p> <p>Status: Patent Pending, Application Published</p>
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<p>Nanotechnology (Optics, Particle Detection)</p>	<p>Bates, Clayton</p>	<p>External Photoemissive Detector for Long Infrared Wavelengths</p>	<p>Description: This technology is an improved method of detecting long infrared wavelengths. Its advantages include its ability to detect extremely low energy photons, provide extremely fast response time and obtain high gains with low noise, thus enabling the detection of single photon events reliably. The detector also eliminates the need for a heterojunction barrier and the necessity of keeping the detector under good vacuum during its operating life. Commercial applications for this invention include military/security detection and surveillance, medical imaging, monitoring of pollutants, and semiconductor processing.</p> <p>Status: Patent No. 8,154,028</p>
<p>Nanotechnology (Optics, Optic-Electronics, Satellites, Information Infrastructure)</p>	<p>Huber, Tito</p>	<p>Nanothermocouple Single-Photon Color-Sensitive Uncooled Light Detector</p>	<p>Description: This invention enables quantum detection at room temperature without the use of the cryogenic cooling systems typically required to deploy such devices. Control of the heat produced by the light sensing device is performed using bismuth telluride (BiTe), the material shown to have the highest thermoelectric efficiency at room temperature. Furthermore, forming BiTe as nanowires creates a thermocouple with a very low thermal mass that further increases thermoelectric efficiency.</p> <p>Status: Patent No. 8,525,095, Application Published</p>

<p>Nanotechnology (Industrial Lubricants)</p>	<p>Mosleh, Mohsen</p>	<p>Gelling Nanofluids for Dispersion Stability</p>	<p>Description: Below-room-temperature and at-room-temperature gelling of nanofluids for dispersion stability and prolonged shelf life without particle settlement.</p> <p>Status: Patent Pending</p>
<p>Nanotechnology (Industrial Lubricants)</p>	<p>Mosleh, Mohsen Belk, John (The Boeing Co.)</p>	<p>Metal Forming Fluids with Dispersed Nanoparticles for Improved Lubrication</p>	<p>Description: New method for making sheet metal forming fluids with improved anti-wear properties through solid lubricant nanoparticles dispersed by sonication.</p> <p>Status: Patent Pending, Application Published, Co-Developed with Support from the Boeing Company</p>
<p>Nanotechnology (Industrial Lubricants)</p>	<p>Mosleh, Mohsen</p>	<p>Nanolubricant Formulations for Extending Elastohydrodynamic and Hydrodynamic Lubrication Regimes and Lowering Friction</p>	<p>Description: This is a new method for making sheet metal forming fluids with improved anti-wear properties through solid lubricant nanoparticles dispersed by sonication. It focuses on preventing wear to the hard surfaces of forming dies while providing conventional lubrication to the softer product being formed. The result of this innovation is greater efficiency, longer tooling life, and lower costs. Commercial applications include any manufacturing in which metals rub up against one another.</p> <p>Status: Patent Pending, Application Published</p>

<p>Nanotechnology</p> <p>(Industrial Lubricants)</p>	<p>Mosleh, Mohsen</p>	<p>Surface Conditioning Nano-Lubricant (Hybrid Nano-Lubricants for Improved Lubrication and Heat Transfer)</p>	<p>Description: A nano-lubricant composition where the lubricant composition includes a flowable oil or grease with nanoparticles dispersed in the flowable oil or grease. The nanoparticles are configured to polish a surface of a structure slowly over a period of time. The nanoparticles have a hardness of at least about 7 Mohs and a diameter that is less than one half the arithmetic average roughness of the surface or a length that is less than one half of the arithmetic average roughness of the surface.</p> <p>Status: Patent Pending, Application Published</p>
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Health Sciences Technologies

<p>Medical Treatment Technology (Chagas Disease Treatments, Trypanosome)</p>	<p>Bakare, Olodapo; Lee, Clarence; Brandy, Yakini; Khraiwesh, Mozna</p>	<p>Method for Inhibiting Trypanosoma Cruzi (Chagas Disease)</p>	<p>Description: Chagas disease is caused by the parasite Trypanosoma Cruzi, and consists of an acute phase that lasts weeks or months. Left untreated, it can lead to a chronic phase that may remain latent for up to 20 years. The current treatment, benznidazole and nifurtimox, have serious side effects, are time-intensive, and are ineffective during the chronic phase of the disease. Moreover, after 40 years of use, traditional medications are being met with parasitic resistance. This technology identifies a family of imido-substituted 1,4-naphthoquinone compounds that have demonstrated a several-fold higher toxicity than nifurtimox against T. cruzi, as well as more benign activity against mouse fibroblasts. These compounds have been subject to preliminary toxicity profiling in vivo in mice, but further study is needed.</p> <p>Status: Patent Pending, Application Published</p>
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<p>Medical Treatment Technology (Leishmaniasis Treatments)</p>	<p>Bakare, Olodapo; Lee, Clarence; Brandy, Yakini; Manka, Cheu</p>	<p>Method for Treating Leishmaniasis</p>	<p>Description: This work identifies a family of imido-substituted 1,4-naphthoquinone compounds with activity against Leishmania donovani, the parasite that causes Leishmaniasis. Specifically, the family of compounds exhibits improved toxicity versus cultured L. donovani, and increased selectivity when compared with its toxicity toward fibroblasts. These new compounds have the potential to be used as either a prophylactic or therapeutic treatment. Since Leishmaniasis is a disease that predominantly afflicts individuals in developing countries and the current treatment is costly, time intensive and has serious side effects, there are incentives to find new effective therapeutics.</p> <p>Status: Patent Pending, Application Published</p>
<p>Medical Treatment Technology (Endophthalmitis and Glaucoma)</p>	<p>Karla, Pradeep; Mangat, Harpal</p>	<p>Method for Treating Endophthalmitis and Glaucoma</p>	<p>Description: The cornea, which contains efflux pumps as well as tight junctions between cells, acts as an efficient barrier to intraocular drug delivery. Thus, only a small percentage of a drug applied topically can cross this barrier to reach the anterior space of the eye. This invention is used for treating conditions of the retina. It calls for the addition of a drug efflux inhibitor to a normal therapeutic regimen to increase the bioavailability of the medication. It could be applicable to various conditions including endophthalmitis, glaucoma, macular degeneration, and diabetic retinopathy.</p> <p>Status: Patent Pending</p>

<p>Medical Treatment Technology (HIV/AIDS)</p>	<p>Karla, Pradeep</p>	<p>Methods of Reducing HIV Transmission /Infection and Compositions Effective for Reducing HIV Transmission and Infection</p>	<p>Description: The inventor has discovered the presence of potent ABC drug efflux transporters on CD4+ T-cells, the initial site of human HIV infection. These efflux transporters lead to poor intracellular HIV drug concentrations. This is a novel therapeutic target for a new class of drugs that would consist of an efflux transporter inhibitor along with a NRTI, NNRTI or PI. The inventor has demonstrated a significant increase (\geq two-fold) in the intracellular drug concentration by using the aforementioned combination. Currently, commercial application is focused on the development of a vaginal microbiocidal gel.</p> <p>Status: Patent Pending</p>
<p>Medical Treatment Technology (Reperfusion Injury)</p>	<p>Mangat, Harpal Karla, Pradeep</p>	<p>Composition and Method for Treating Ischemic Neuron Reperfusion Injury</p>	<p>Description: Ischemia can harm an organ by impeding blood flow. The reciprocal mechanism of ischemia, reperfusion, can also have several deleterious effects on an organ, including an increase in intracellular calcium. Although Dantrolene is the traditional method used to prevent or minimize neuronal cell damage caused by an increase of calcium during the reperfusion stage, it is not effective in all cases. Dantrolene alone is not effective at protecting neurons affected by nerve gas attack or traumatic brain injury (TBI), including certain types of stroke. Furthermore, in the case of nerve gas attack, the preferred method of delivery is through a nebulizer or gas mask. However, current Dantrolene is too harmful to the lungs to make this a good option. This invention, a combination of Dantrolene with a residue of FMOC-valine, can prevent the detrimental rise of intracellular calcium in nerve gas attack and TBI. Moreover, it can be delivered through a gas mask or nebulizer.</p> <p>Status: Patent Pending</p>

<p>Medical Treatment Technology (Degenerative Brain Conditions)</p>	<p>Nwulia, Evaristus; Kulkarni, Amol;</p>	<p>Curcumin Compounds for the Treatment of HIV Dementia</p>	<p>Description: Research has been done on curcumin as a possible treatment for HIV-related brain dysfunction. However, bioavailability of this compound to the brain is limited when administered orally. This invention is lipophilic curcumin analogs that show increased solubility and dispersibility, and protect neurons via increased levels of chemicals such as brain-derived neurotrophic factor (BDNF). The analogs are delivered intranasally, traveling directly to the brain via the olfactory nerve, using an olfactory neuroplastic device along with a nasal cannula. Can be delivered directly to the olfactory nerves via Howard University's Olfactory Stimulation System Technology.</p> <p>Status: Patent Pending</p>
<p>Medical Treatment Technology (Degenerative Brain Conditions)</p>	<p>Nwulia, Evaristus; Segun, Omoniyi</p>	<p>Olfactory Stimulation System for Neurological Disease</p>	<p>Description: This invention is a device that can deliver novel, beneficial combinations of olfactory stimulative aromas to patients suspected of suffering from early cognitive decline. The Olfactory Neuroplastic Device (OND), as this technology is called, delivers aroma stimulation through a portable mechanical pump that can be used for all or part of the day. The device has been used to improve verbal and cognitive skills in two patients. Further human trials are scheduled.</p> <p>Status: Patent Pending</p>
<p>Medical Treatment Technology (Orthopedics, Bone Cement)</p>	<p>Wang, Tongxin; Mitchell, James</p>	<p>Improved Calcium Phosphate and Polyactic Acid Bone Cements</p>	<p>Description: Dr. Wang and colleagues have identified methods of combining calcium phosphate with polylactic acid (PLA) that provide required strength and flexibility properties for use as an improved bone cement.</p> <p>Status: Two (2) Patents Pending</p>

<p>Pharmaceuticals (Small Molecule Therapies, Cancer Treatments)</p>	<p>Bakare, Olodapo</p>	<p>Prodrugs for Cancer Treatment</p>	<p>Description: Although emetine has proven to be cytotoxic to cancer cells, it has also exhibited general cytotoxic properties that make it nonviable as a therapeutic. This invention links protective groups to the emetine structure that prevent systemic side effects that normally occur. The protective groups are liberated upon encountering chemical or enzymatic changes such as those present in the tumor microenvironment. Thus the new compounds provide targeted chemotherapy, ameliorating non-specific exposure and causing cytotoxicity only to the tumor itself. These compounds may have application in multiple cancer types including breast cancer, prostate cancer, lung cancer, and leukemia.</p> <p>Status: Patent Pending, Application Published</p>
<p>Pharmaceuticals (Amodiaquine Manufacture, Malaria Drugs)</p>	<p>Fortunak, Joseph; Kulkarni, Amol; King, Christopher</p>	<p>Efficient, Inexpensive, Green Synthesis of the Malaria Drug Amodiaquine</p>	<p>Description: Malaria treatment currently requires synthesizing the drug amodiaquine with its analogs in a three to four step process that can take up to five days to complete. This process produces a 60-65% yield, and generates environmentally hazardous solvents. Howard University has invented an alternative synthesis method that is less expensive, has a higher yield of 90%, and has a lower environmental impact. It requires only a single vessel, can be completed in a single day and requires fewer solvents and reagents.</p> <p>Status: Patent Pending</p>

Pharmaceuticals (Small Molecule Treatments, Ebola)	Nekhai, Sergei; Kovalskyy, Dunityro	Inhibitors of Protein Phosphatase-1 for Ebola Treatment	<p>Description: The inventors have identified a family of small molecules, host cell protein phosphatase-1 (PP1) inhibitors, that can be used to treat and/or prevent Ebola virus infection as well as decrease HIV1 replication. PP1 is needed for the dephosphorylation of VP30, a viral protein needed for Ebola virus replication. These PP1 inhibitors have been shown to prevent Ebola virus replication without any cellular toxicity.</p> <p>Status: Patent Pending</p>
Pharmaceuticals (Small Molecule Treatments, HIV, AIDS, Ebola)	Nekhai, Sergei; Kovalskyy, Dunityro	Inhibitors of Protein Phosphatase-1 for HIV-1 Treatment	<p>Description: The inventors have identified a family of small molecules, host cell protein phosphatase-1 (PP1) inhibitors, that can be used to treat and/or prevent Ebola virus infection as well as decrease HIV1 replication. PP1 is needed for the dephosphorylation of VP30, a viral protein needed for Ebola virus replication. These PP1 inhibitors have been shown to prevent Ebola virus replication without any cellular toxicity.</p> <p>Status: Patent No. 8,278,326</p>
Pharmaceuticals (Small Molecule Treatments, HIV, AIDS)	Nekhai, Sergei; Kovalskyy, Dunityro	Iron Chelators as HIV-1 Inhibitors	<p>Description: Elevated iron levels can allow the HIV-1 virus to replicate more rapidly and efficiently. HIV-1 infected patients suffering from iron overload disease have a poor prognosis. The inventor has identified novel iron chelators that inhibit HIV-1 replication for patients with iron overload disease. These newly identified compounds can be administered in low doses, and have the potential to be less cytotoxic to patients than other iron chelators. Specifically, these new iron chelators decrease the activity of host cell CDK2, CDK9 and viral Tat, and can also induce expression of NF-kB inhibitor, IKBα, and HO-1.</p> <p>Status: Patent Pending</p>

Pharmaceuticals (Small Molecule Treatments, Seizure)	Scott, Kenneth; Nicholson, Jesse; Edafiogho, Ivan	Enaminone Esters	Description: Novel synthetic organic compounds, enaminone esters, having distinct potent anticonvulsant activity with slight toxicity. . Status: Patent No. 5,616,615
Pharmaceuticals (Meningitis Vaccines)	Tai, Stanley; Lee, Robert (NIH)	Dual Meningitis Vaccine	Description: This vaccine formulation is an immunogenic composition for inducing antibodies to <i>S. pneumoniae</i> and <i>N. meningitidis</i> , providing dual protection against infections. The immunogenic composition may be administered to a subject by several different routes: intramuscular, intranasal, oral, sub-cutaneous, transdermal and transmucosal. With its dual protection, this vaccine reduces preparation and administration costs. Status: Patent No. 8,003,112, Co-Commercialized with National Institutes of Health

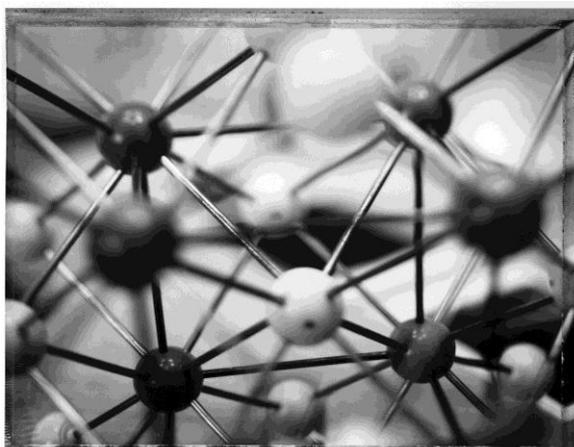


Electrical Engineering & Computer Science Technologies

<p>Computer Sciences (Software, Healthcare)</p>	<p>Anderson, John</p>	<p>PET Based Voxel-Resolution Myocardial Blood Flow Analysis</p>	<p>Description: The ability to accurately quantify myocardial blood flow (MBF) is critical to diagnosing the extent and severity of coronary artery disease. This algorithm, which is designed for use with a PET scanner, can measure absolute myocardial blood flow quantitatively. Specifically, it combines pharmacological kinetics and voxel (volumetric pixel) myocardial blood flow.</p> <p>Status: Patent Pending, Application Published.</p>
<p>Computer Sciences (Software, Mobile Applications)</p>	<p>Burge, Legand</p>	<p>Context-Aware Computing Architecture and Software Platform</p>	<p>Description: Advertising and service industries are always seeking new ways to connect with mobile application users as they navigate through a defined space (i.e. college campus, shopping mall). This invention provides a platform for media-rich, context-aware mobile applications. The mobile-device user can receive specific messages based on the user's location without explicit user intervention.</p> <p>Status: Patent Pending, Application Published</p>

Computer Sciences (Hardware, Processors)	Gloster, Clay; Gay, Wanda; Amoo, Michaela	Multiple-Memory Application-Specific Digital Signal Processor	<p>Description: A customizable, configurable multiple-memory Application-Specific Digital Signal Processor (ASDSP) capable of achieving high input-high output computational capabilities, and providing a significant increase in input/output data bandwidth.</p> <p>Status: Patent Pending, Application Published</p>
Electrical Engineering (Architectural Lighting Technology)	Kim, Charles	Architectural, LED Lighting Array Control System	<p>Description: This invention allows one LED within a large-scale lighting array to control the entire system. As a result, it eliminates the need for expensive and cumbersome wiring and controller banks traditionally used in large LED-lighting arrays. This technology's potential applications include commercial signage, architectural lighting, and large holiday light displays.</p> <p>Status: Patent No. 8,525,421, Application Published</p>
Electrical Engineering (Electrical Fault Detection)	Kim, Charles	Method of Detection of Intermittent Faults in Electrical Wiring Via PLC Data	<p>Description: Intermittent faults are difficult to detect, but if left untreated, can lead to permanent faults resulting in dangerous and costly consequences. This detection system injects a signal at one location of the electrical wire system and diagnoses the health status of the system by measuring the error rate of the signal at another location. If an error is found, an alarm or annunciation is activated to alert the user of an intermittent fault. This invention can be adapted to a variety of existing electrical systems. Potential applications include aerospace, automotive, nautical, and construction wiring systems.</p> <p>Status: Patent No. 8,102,779, Patent No. 8,050,002, & One (1) Patent Pending.</p>

<p>Electrical Engineering (Electrical Fault Detection)</p>	<p>Kim, Charles</p>	<p>Sub-Cycle Preemptive Fault Location in the Power Grid</p>	<p>Description: The technology provides electric power providers the ability to anticipate power failures and act timely to prevent power outages. The new system records spurious signals that occur in the course of regular power-grid activity. Irregular, short-term drops in signal level are recorded and logged. These drops typically vanish in less than 10 milliseconds. The new system simulates the application of a ghost signal in the grid with the objective of finding the type of imaginary signal that re-creates the above mentioned spurious drop.</p> <p>Status: Patent Pending, Application Published, Co-Commercialized with San Diego Gas and Electric</p>
<p>Electrical Engineering (Residential Energy Efficiency)</p>	<p>Momoh, James</p>	<p>Customer Power Quality Monitor</p>	<p>Description: An innovative scheme that uses simple but advanced computational intelligence techniques coupled with systems modeled to achieve the monitoring and control of power quality within a residence.</p> <p>Status: Patent No. 8,244,406</p>
<p>Green Energy Technology (Coal, Clean Coal, Mercury Elimination)</p>	<p>Aluko, Mobolaji; Ekechukwu, Kenneth; Akers, David (CQ, Inc.) Lebowitz; Howard (CQ, Inc.)</p>	<p>Process for Removal of Hazardous Air Pollutants from Coal</p>	<p>Description: An improved process for removing mercury and other trace elements from coal containing pyrite by forming a slurry of finely divided coal in a liquid solvent capable of forming ions or radicals having a tendency to react with constituents of pyrite or to attack the bond between pyrite and coal and/or to react with mercury to form mercury vapors, and heating the slurry in a closed container to a temperature of at least about 50.degree. C. to produce vapors of the solvent and withdrawing vapors including solvent and mercury-containing vapors from the closed container, then separating mercury from the vapors withdrawn.</p> <p>Status: Patent No. 6,156,281</p>



Chemical and Biological Technologies

<p>Biotechnology (Plant Gene Modification, GMO)</p>	<p>Ullah, Hemayet Dakshanamurthy, Siva, (Georgetown University)</p>	<p>RACK-1 Gene Modification for Drought Protection in Plants</p>	<p>Description: Drought damage to food and biofuel crops is a serious agricultural concern. The current methods to combat drought-induced crop deterioration are costly, highly sensitive to light, or provide incomplete protection. This invention identifies a series of novel compounds that inhibit the function of the RACK1A gene. Inhibiting the RACK1A produces crops with improved drought resistance, and may also protect plants from other environmental stressors.</p> <p>Status: Patent Pending, Co-Commercialized with Georgetown University</p>
<p>Polymer Technology (Industrial Polymers)</p>	<p>Ayorinde, Folahan; Hassan, Mahmoud</p>	<p>Acrylate Ester</p>	<p>Description: Process by which olefin acid anhydrides are produced without the use of an external heat source, without catalysts, without polymerization inhibitors and without solvent.</p> <p>Status: Patent No. 5,491,244</p>

Polymer Technology (Plant Modification)	Ayorinde, Folahan; Hassan, Mahmoud	Deacidification of Vegetable Oils	Description: A novel method for the deacidification of vegetable oils at ambient temperature enabling acceptable industrial and/or edible quality. Status: Patent No. 5,414,100.
Polymer Technology (Industrial Polymers)	Ayorinde, Folahan; Nwaonicha, Chakwuma	Synthesis of 12-Aminododecanoic Acid	Description: A novel method of the synthesis of 12-aminododecanoic acid, a valuable intermediate for the production of the monomer for Nylon-12. Status: Patent No. 5,530,148.
Polymer Technology (Industrial Polymers)	Ayorinde, Folahan; Nwaonicha, Chakwuma	Synthesis of 12-Oxododecanoic Acid Oxime from Vernolic Acid	Description: An important novel aldoxime for use as an industrial intermediate for the conversion to several important monomers; including Nylon-12 an engineering polyamide fiber having several uses. Nylon-12 is often used as a curing agent for epoxy resins, modifier of polyester materials and in the preparation of oil and gasoline resistant tubing. Status: Patent No. 5,434,307.
Polymer Technology (Industrial Polymers)	Ayorinde, Folahan; Nwaonicha, Chakwuma	Synthesis of Nylon-11 Monomer	Description: A novel method of the synthesis of Nylon-11 from a compound derived from Vernonia oil; thus reducing the number of steps involved and eliminating an energy-intensive pyrolysis reaction. Status: Patent No. 5,491,244



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