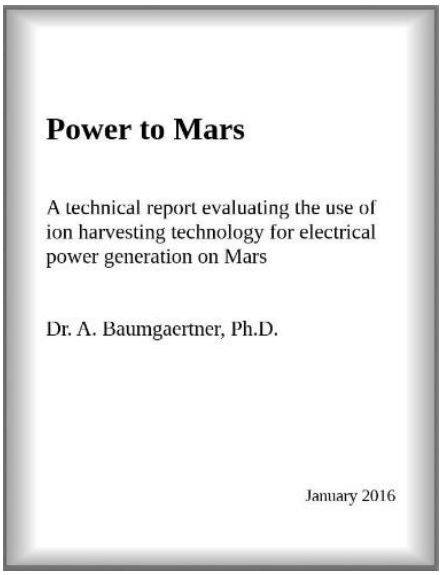
Ion Power Group, LLC

Power Technology Developed for Mars Exploration – can benefit the US Military

Ion Power Group is a leading pioneer in Ion Harvesting Technology utilizing nanotechnology to derive non-polluting high voltage electricity via harvesting ionic charges provided by naturally occurring atmospheric ions day and night. *Ion Harvesting Technology should not be confused with other technologies that harvest manmade radio frequency energy in the air.*



On Feb 10th 2016, Professor of Atmospheric Physics Dr. Andreas J. Baumgaertner PhD with the German Aerospace Center, published a ground breaking technical report titled "Power to Mars" recommending that **Ion Harvesting Technology be used as part of a reliable power source on Mars,** seen here http://dx.doi.org/10.5281/zenodo.45877

Ion Harvesting Technology, with a duty-cycle approaching 100%, is expected to become a staple of reliable electrical power generation for future NASA and Aerospace Mars missions.

Ion Harvesting Technology has been demonstrated to produce usable electricity day and night on Earth – regardless of weather conditions – charging up capacitors to power motors, lights and water electrolysis for producing hydrogen gas.

NEXTip Law Group LLC

A 3:33 minute video about Ion Harvesting Technology, posted by the Intellectual Property firm of NextIP Law Group LLC, can be viewed here https://youtu.be/_TrU82_ZPYg

Ion Power Group LLC has been awarded patents for its Ion Harvesting Technology by the **USA, China, Russia, Canada and Japan** with patent rights pending in 28 European Union nations. Patented nanomaterials for use in Ion Harvesting Technology include **carbon, graphite, silicene and graphene.** Ion Power Group patents can be viewed online by accessing the below links provided by a Goggle search.

US 8686575 B2	United States	https://patents.google.com/patent/US8686575B2/en
US 7478712 B2	United States	https://patents.google.com/patent/US7478712B2/en
US 7439712 B2	United States	https://patents.google.com/patent/US7439712B2/en
US 8810049 B2	United States	https://patents.google.com/patent/US8810049B2/en
CN 101390177 B	China	https://patents.google.com/patent/CN101390177B/en
2430455	Russia	Not available online, hard copy available upon request
CA 2647385	Canada	https://patents.google.com/patent/CA2647385C/en
JP5552236B2	Japan	https://patents.google.com/patent/JP5552236B2/en
14/454,308	United States	https://www.google.com/patents/US20160043661?dq=14/454,308&hl=en&sa=X&ved=0ahUKEwjkp5Guy8rLAhXKJB4KHd-MBTAQ6AEIHDAA

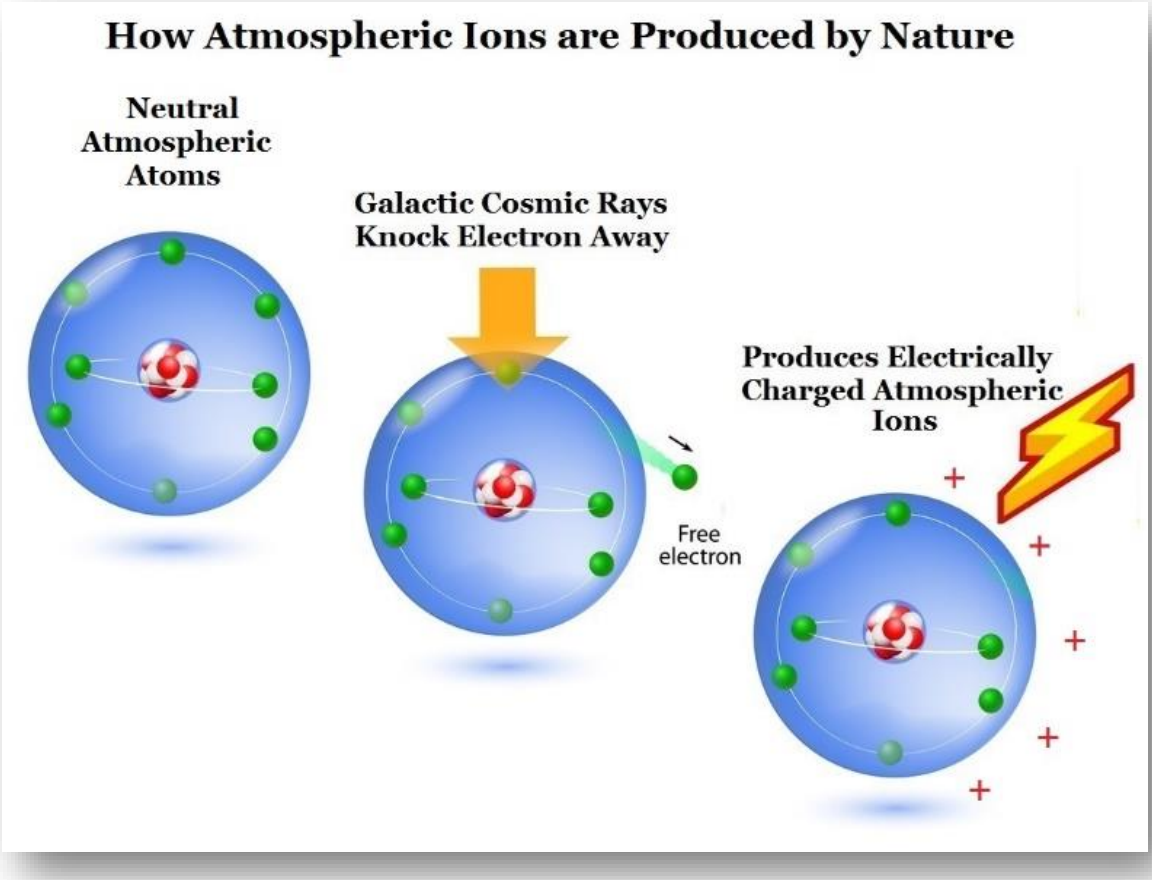
As a partner with the Department of Defense, Ion Power Group proposes to conduct field sustainability and functionality research of Ion Harvesting Technology to refine, evaluate and configure its practical application under tactical and strategic conditions for the United States Military forces. Specifically, its utility in powering small electric loads and its utility in hydrogen gas production.

Ion Harvesting Technology – Principle of Operation

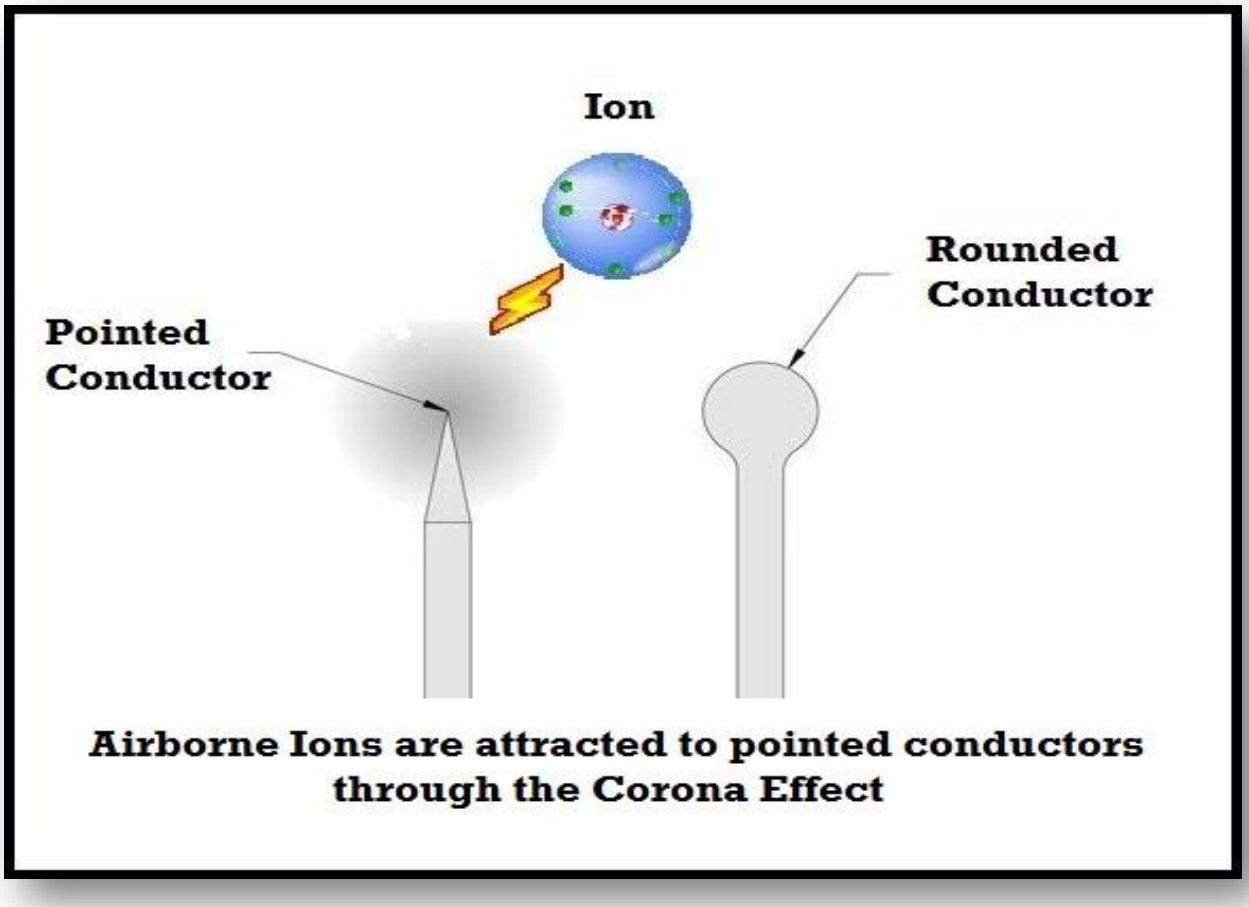
Filled with trillions of naturally occurring electrically charged ions, the Earth's atmosphere is a vast electric circuit teeming with untapped, un-harvested energy - perpetually fed from a combination of Galactic Cosmic Rays (GCRs), thunderstorms and natural radon gas seepage. See http://nova.stanford.edu/~vlf/IHY_Test/Tutorials/GlobalElectricCircuit/GlobalElectricCircuit.pdf

For a general discussion of Ion Harvesting Technology, see https://ionpowergroup.com/how-it-works-on-earth/

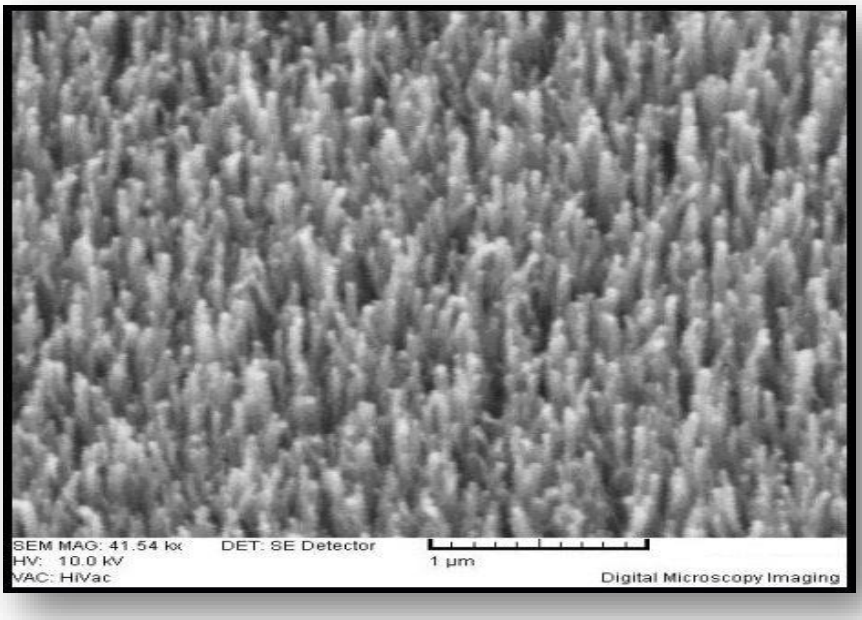
Galactic Cosmic Rays (GCRs) from deep space, traveling at enormous velocity, constantly bombard the Earth's atmosphere from all directions 24/7. A portion of the GCRs collide with oxygen and nitrogen atoms in the atmosphere. The GCR's kinetic energy impacts oxygen and nitrogen atoms and 'knocks off' electron(s) from the atoms transforming electrically neutral atoms into electrically imbalanced – or charged – atoms known as ions. The below video clip produced by the Large Hadron Collider project shows visual proof of Galactic Cosmic Rays bombarding Earth's atmosphere near the start and end of the clip https://www.youtube.com/watch?v=xky3f1aSkB8



Ions – electrically charged atoms – migrate to conductive points due to the Corona Effect. As such, airborne ions tend to gather at conductive points rather than non-pointed conductors. See http://earlystreameremission.com/data/S%203%202.pdf

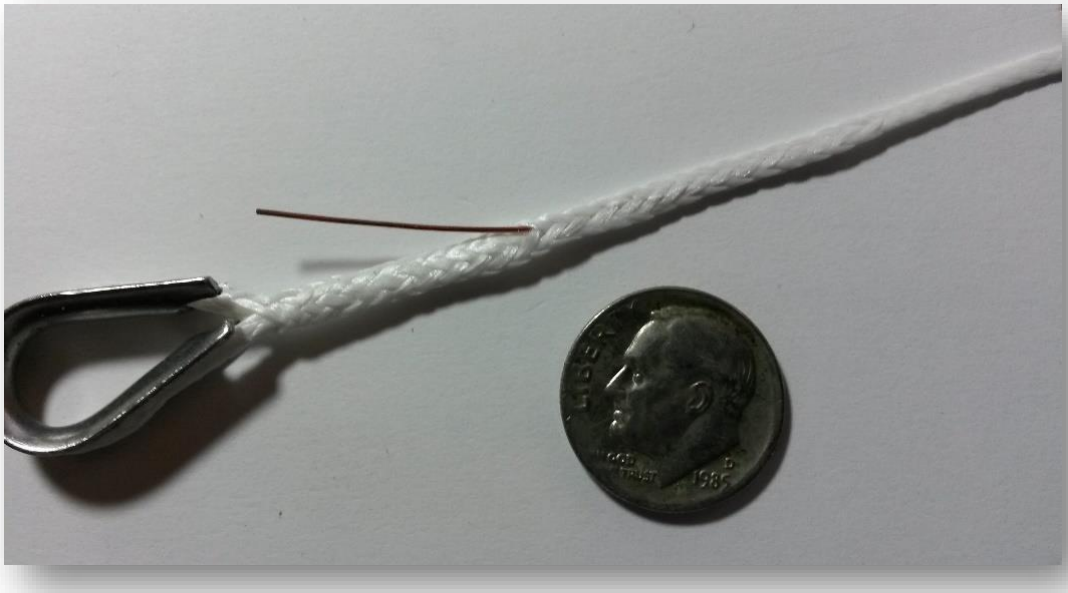


If the conductive point is at a lower electrical potential than the nearby ions, the electric charge of the airborne ions will migrate and transfer to the conductive point most efficiently.

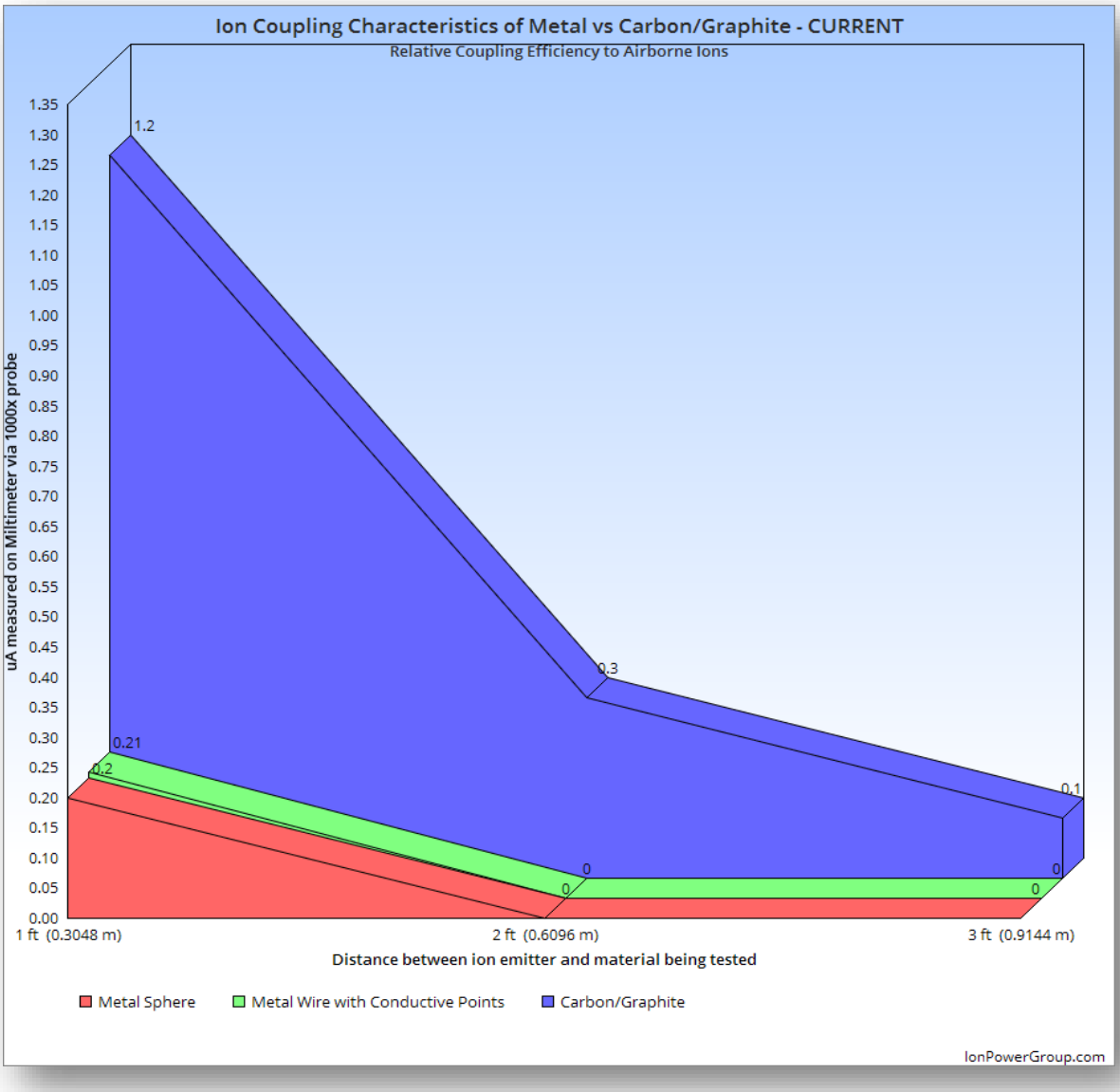


Ion Power Group's lightweight flexible ion collectors are made of carbon/graphite (and soon Graphene due to a 3-3-2016 patent allowance) nanomaterial shown in the electron microscope image. With an electron microscope, one can see the ***millions of microscopic pointed conductors*** that facilitate ion coupling – absorbing – the ion's high voltage direct current electric charge.

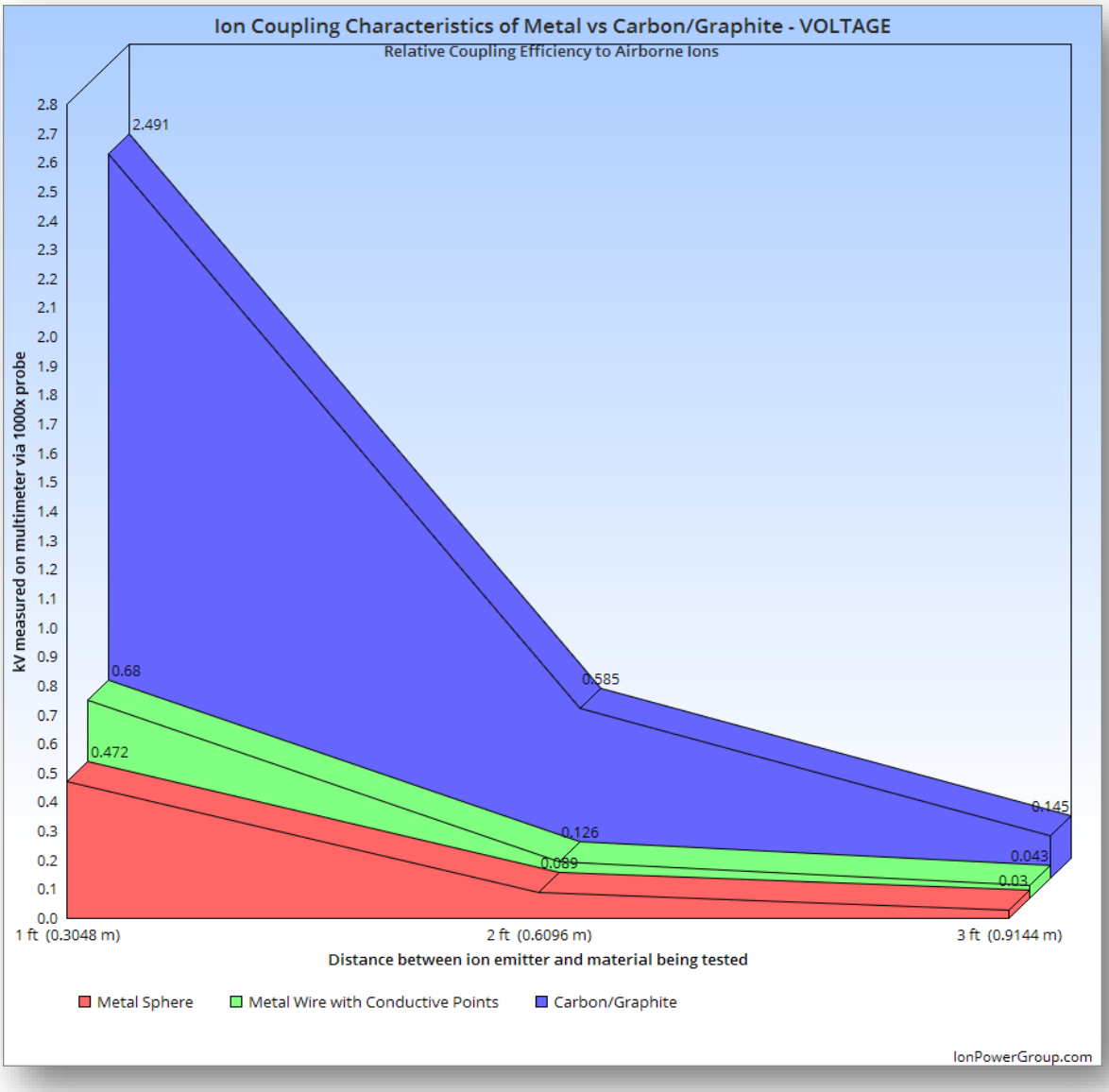
Ion Power Group's system approach of maintaining the nanomaterial at a lower electrical potential than the surrounding atmospheric ions allows the transfer of high voltage DC electric charge more efficiently. A specially designed electrically conductive tether made of similar material used to safely landed robotic rovers on Mars, conveys the harvested electricity to the ground.



Researchers dating back to 1752 typically use pointed metal rods, as well as spherical metal and flat metal, elevated high in the air by balloons or kites to couple to airborne ions. See section 1.2 of http://arxiv.org/ftp/physics/papers/0506/0506077.pdf Early in Ion Power Group's research, it was recognized that metal, as a coupling material, was inherently limited. Consequently, Ion Power Group performed extensive research into coupling materials - culminating in the discovery and subsequent patenting of nanomaterials that, compared to their metal counterpart, are superior in ion harvesting. The performance advantage of carbon/graphite nanomaterials over metal is displayed in the two following graphs.

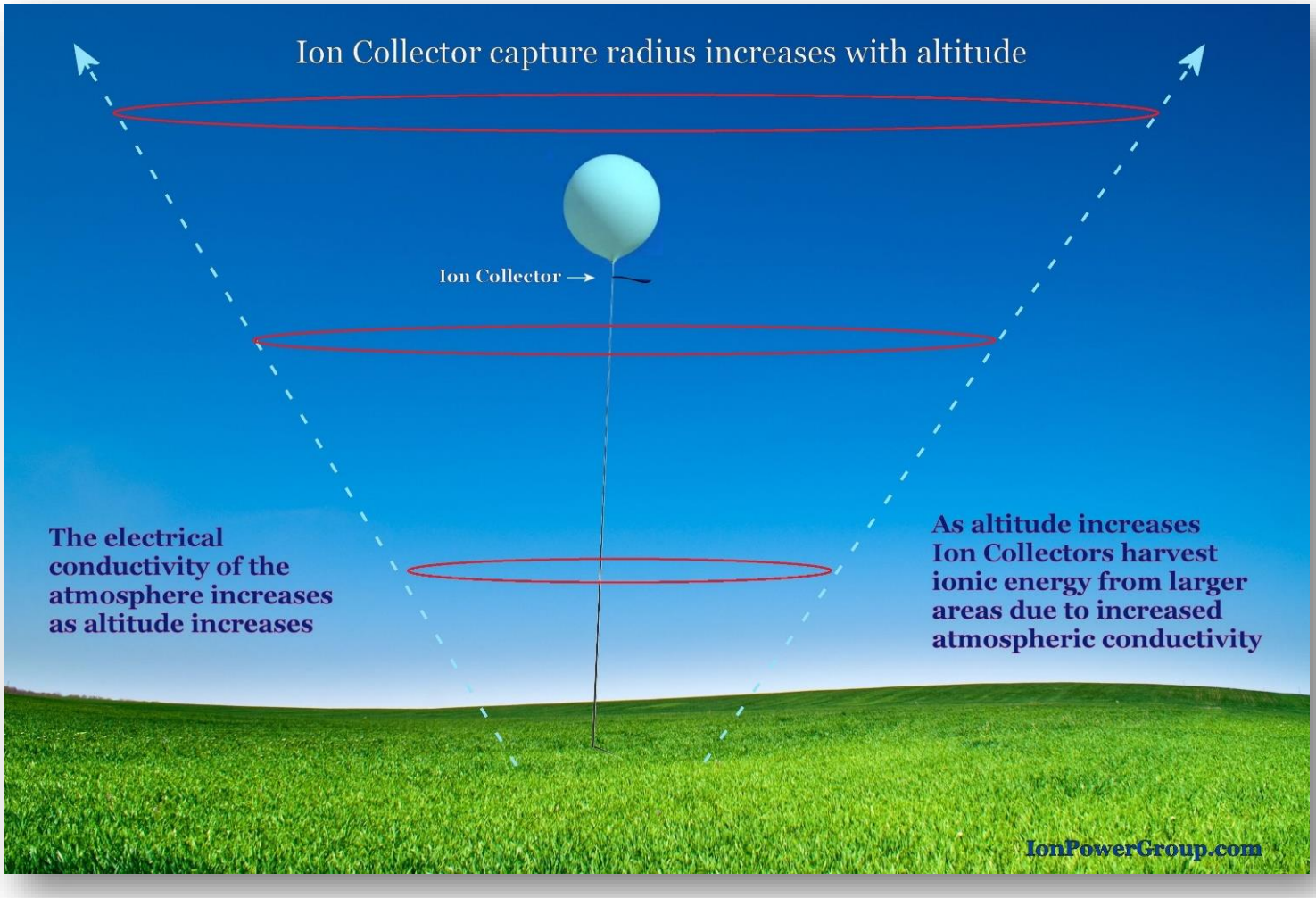


Color Code: Spherical metal conductor is red. Pointed metal conductor is green. Nanomaterial carbon/graphite is purple. In these test results, a greater measurement indicates greater efficiency at harvesting airborne ions to produce electricity.



Conclusion: Carbon/graphite nanomaterial provides superior performance characteristics – compared to metal - in coupling to airborne ions including a corresponding greater yield of harvested electricity.

Larger versions of both charts can be seen 1/3 down this url https://ionpowergroup.com/how-it-works-on-earth/



During fair weather, natural atmospheric DC voltage increases generally at 100-300.vdc/meter above ground or sea level, day and night depending on local weather and time of season. During cloudy or stormy weather, atmospheric voltages can increase 2,000-3,000.vdc/meter, day or night. Because the electrical conductivity of the atmosphere increases with altitude, the capture radius in which ion collectors harvest electricity also increases with altitude http://www.cnofs.org/Handbook_of_Geophysics_1985/Chptr20.pdf

For example, during fair weather conditions, ion collectors might harvest 6,000 volts DC (6kV) at about 200-300 feet altitude. However, during stormy weather, 6,000 volts DC (6kV) might be harvested at only 10-20 feet altitude. There are many variables that effect the level of electrical power harvested by ion collectors including humidity, temperature, lat/long, geographic elevation, season, aerosol particles, ground radon gas emissions, however, regardless where Ion Harvesting Technology is deployed on Earth, ions are always present in the atmosphere to harvest for electricity.

Electrical Current

The atmospheric current is low during local fair weather conditions but can increase many orders-of-magnitude during stormy conditions. The solution to providing an increase in harvested power during fair weather conditions is to provide greater altitude to the ion collector thereby increasing the harvested voltage. Regarding situations where the current does not increase with increased altitude, a increase in harvested voltage (due to the ion collector being raised to a higher altitude) results in a net power increase as shown in the formula outlined below.

Ion harvesting technology addresses the problem of low atmospheric current by increasing the altitude of ion collectors thereby increasing overall harvested power. Due to a significant increase in ionic air density during localized storms, the altitude of the ion collectors can be greatly reduced, in some case near to ground level, thereby protecting the balloon (or kite) or relying on pole supported ion collectors during storms.

P=VxI. Therefore, if I is constant, as V increases, P increases proportionately

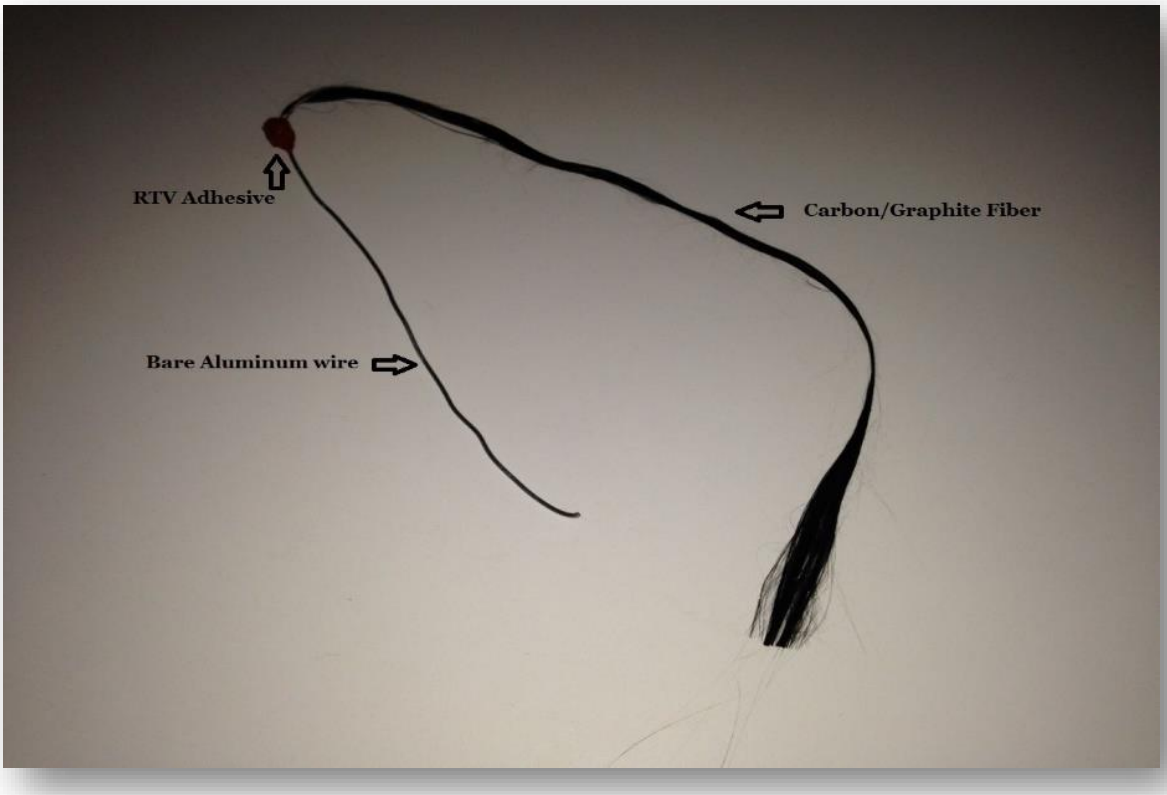
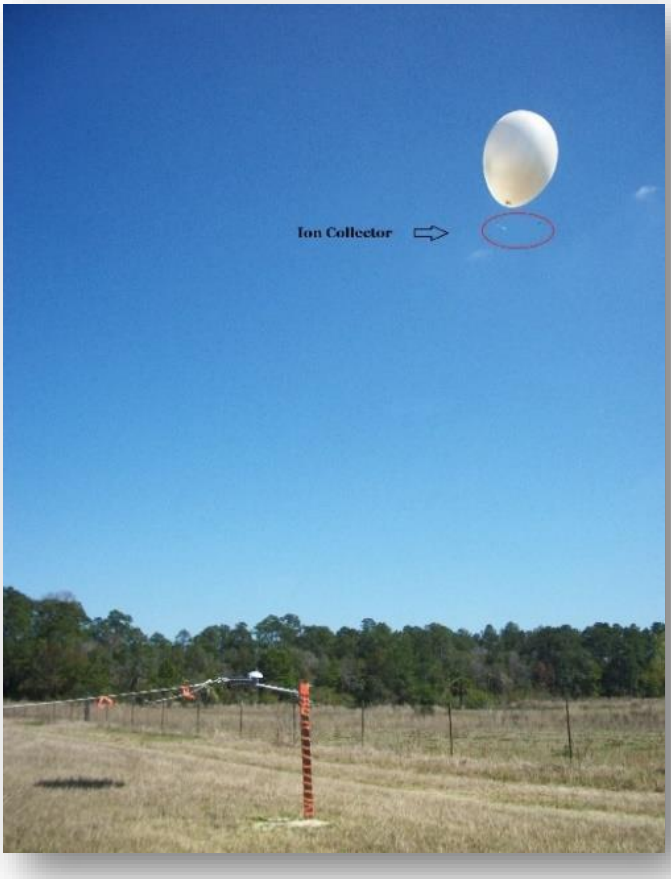


Image of a patented Ion Collector made of carbon/graphite weighing approximately 1 ounce.

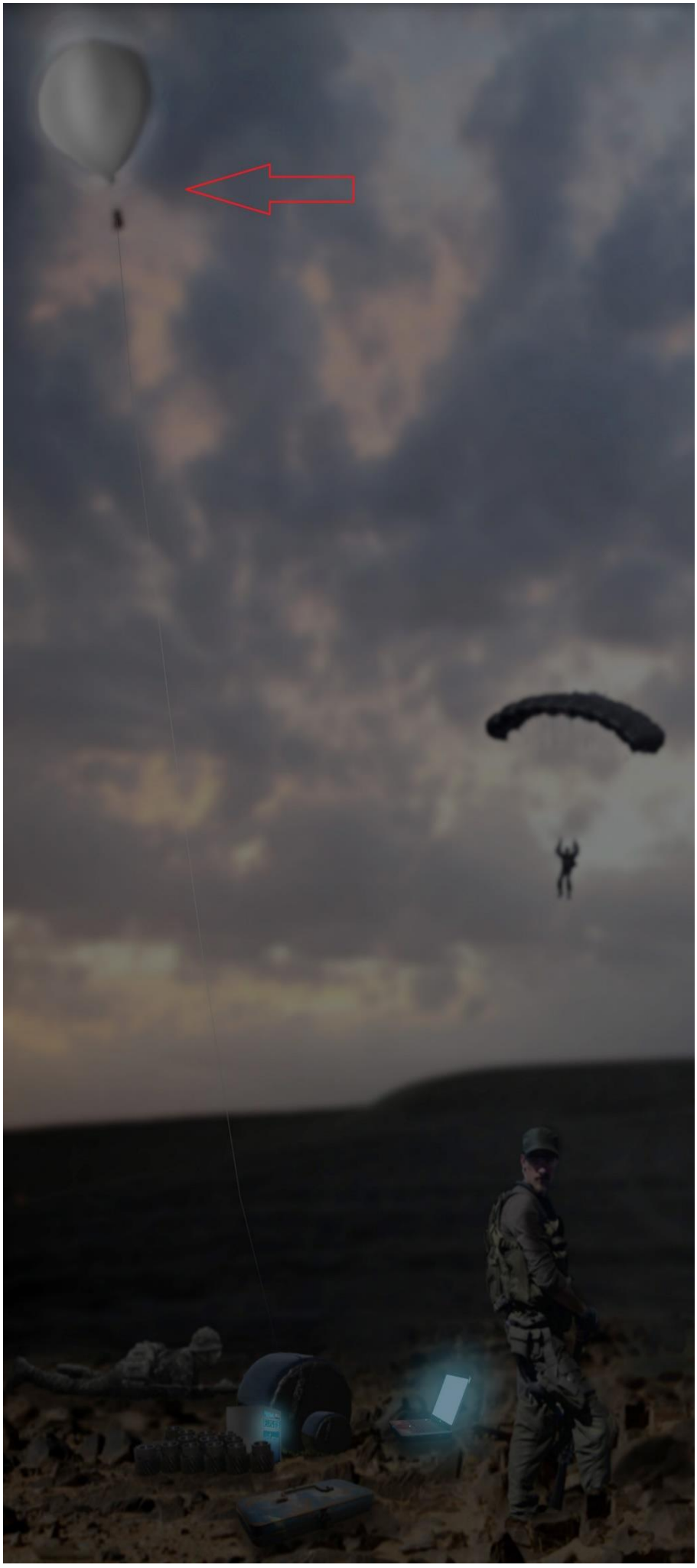
It is of importance to note that with the recent introduction by Ion Power Group of more effective nanomaterials, measurements of electrical current available in the atmosphere - conducted by past researchers using metals - may need to be updated and revised.

Ion Power Group has achieved a greater level of success at harvesting atmospheric electricity – compared to other research projects - primarily due to the advantage of utilizing more effective patented nanomaterials in the harvesting process, rather than traditional metal.



A lightweight, durable Ion Collector (about 1 ounce located below the balloon) just prior to being launched to altitude on a tethered balloon.

A weather balloon and ion collector attached to a specially developed strong/lightweight tether containing an internal insulated wire to convey harvested high voltage electricity to the ground.

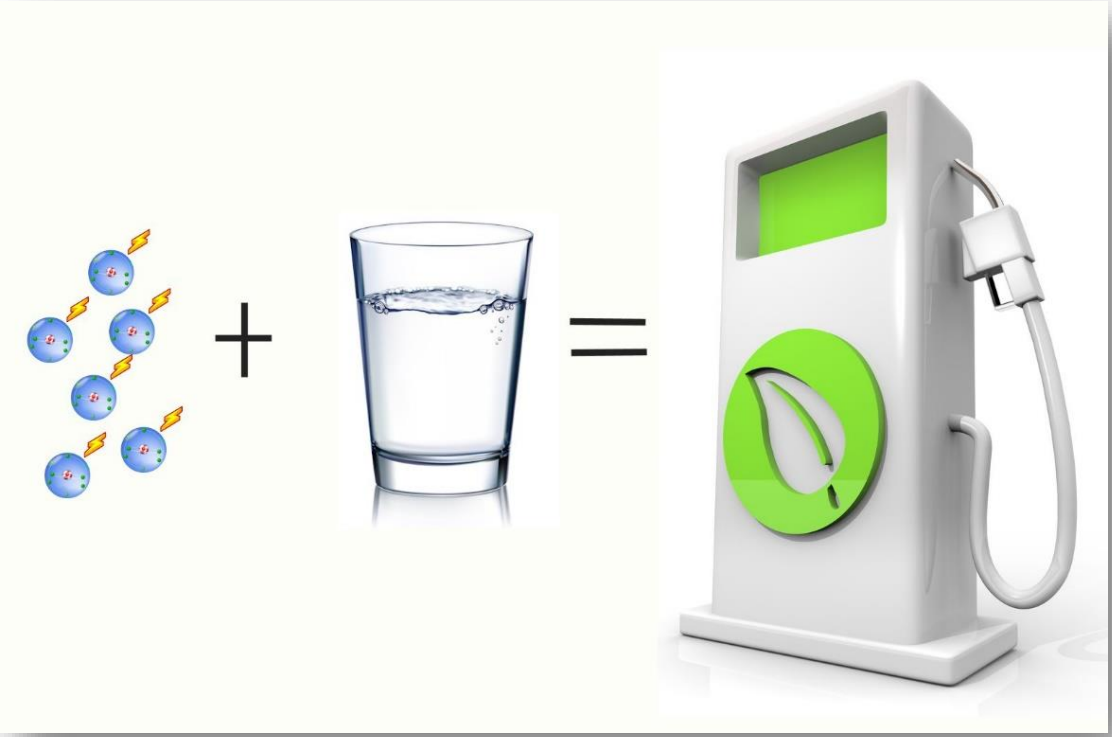


Mission Status: Solar panels haven't worked for days due to overcast conditions. Battery packs are almost spent as nighttime approaches. Field communications, beacons, computers and GPS are on the verge of failure for lack of power.

The solution? A soldier launches a tethered balloon or kite, equipped with Ion Power Group's ion collector. The moment the balloon reaches altitude, the ion collector immediately begins delivering high voltage electricity flowing through a specially designed tether to the ground where it is converted into low voltage electricity and begins charging storage cells used to power mission critical equipment or the production of hydrogen gas from water.

With proper funding, Ion Power Group seeks to make the above scenario a reality for the US military. Ion Power Group proposes to conduct additional research and development focused on refining and packaging its patented ion harvesting technology for use by the United States Military.

Hydrogen Gas produced in the field by Ion Harvesting Technology



Ion Power Group has shown that it is possible to utilize electricity produced by Ion Harvesting Technology to power electrolysis to produce hydrogen gas (and oxygen gas) from water in proof-of-concept quantities - see the 4th video clip from the top of this url https://ionpowergroup.com/proof-of-concept-clips/

It is conceivable, that with additional funding, Ion Harvesting Technology could provide the energy required to help support deployed/remote Military units for the production of hydrogen gas from water sources anytime, anywhere on Earth – at the industry quality level required to power electric equipment or for use as alternative **fuel for vehicles**, cooking food, or providing lift for the balloons elevating the ion collectors to altitude.

Ion Harvesting R&D Project for Military Applications

Ion Power Group proposes a six-month research and development project to determine, under various weather conditions, the feasibility of Ion Harvesting Technology for use by United States Military and the maximum electrical power levels that can be achieved through Ion Harvesting Technology.

A project budget/job proposal will be provided upon request:

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Alternative contact is Intellectual Property attorney Benjie Balser at bbalser@nextiplaw.com

Closing note about a patented wonder material that can benefit the Military

GRAPHENE is described by the global scientific community as 'the new wonder material' destined to revolutionize energy production (including within the Military). Graphene conducts electricity better than copper. It is 200 times stronger than steel but six times lighter. It is lightweight, transparent and flexible https://www.theguardian.com/science/2013/nov/26/graphene-molecule-potential-wonder-material The two scientists who discovered Graphene were awarded the 2010 Noble Physics Prize.

On March 3rd, 2016, the United States Patent Office allowed Ion Power Group's patent application for the use of GRAPHENE for energy production on airplanes, drones, blimps, balloons, kites, satellites, cars, boats, trucks, including automobiles and other transportation conveyances with tires), trains, motorcycle, bikes, skateboards, scooters, hovercraft, (automobiles and conveyance of any kind) , billboards, cell towers, radio towers, camera towers, flag poles, towers of any kind including telescopic, light poles, utility poles, water towers, buildings, skyscrapers, coliseums, roof tops, solar panels and all fixed or mobile structures exceeding 1 inch in height above ground or sea level.
https://www.google.com/patents/US20160043661?dq=14/454,308&hl=en&sa=X&ved=0ahUKEwjkp5Guy8rLAhXKJB4KHd-MBTAQ6AEIHDAA

Due to the recent allowance provided by the US Patent Office to Ion Power Group regarding the use of the 'wonder material' GRAPHENE for energy production on all the above platforms (red font), Ion Power Group is ideally and uniquely positioned to conduct tests and evaluations regarding special operations field uses for GRAPHENE including the benefits of upgrading selected military ground vehicles, watercraft, aircraft and spacecraft with Ion Harvesting Technology for the production of supple-

mental onboard vehicle electricity and/or hydrogen gas production (ion harvesting plus the triboelectric effect) that can conceivably be used to improve ground, water and aircraft vehicle range, performance and fuel economy.