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LightFuel™ Express

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NASA Selects Nanoptek for SPINOFF 2016. We are proud to announce that NASA has selected Nanoptek and our solar hydrogen technology to be included in SPINOFF 2016, NASA's premier annual book publication. We are one of only 9 *Environment and Energy* technologies and one of only 52 technologies, in total, to be showcased. Winning highly competitive Phase I and II NASA SBIRs in 2002 and 2003 provided our first major funding for developing our technology for splitting hydrogen from water with sunlight. SPINOFF focuses on technologies that will help us here on Earth as well as in future colonization of, for example, Mars, as popularized in the recently acclaimed movie *The Martian*. We predict that Nanoptek's solar hydrogen technology will someday provide hydrogen for rocket fuel and solar energy storage and oxygen for Martian pioneers to breathe, all from the new-found water on that planet. Although Mars is much farther from the sun than Earth is, the part of the solar spectrum that our technology uses is of nearly the same intensity. You can read the full article beginning on page 122 or order a free copy of SPINOFF at: <https://spinoff.nasa.gov>.



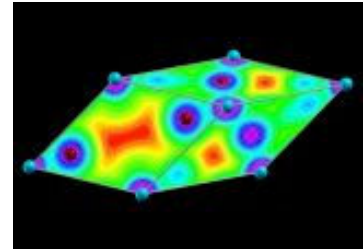
COP21 2015 Paris Climate Conference. Congratulations to all nations and negotiators involved, and especially to the host city of Paris! The agreement reached by the Conference of Parties in Paris in December 2015, while not perfect, is a good and important step toward preventing a global warming crisis. We at Nanoptek have been working hard since 2002 to develop technologies that will help us all keep our planet habitable, but those of us in the technology space can only go so far without the support and cooperation of governments around the world. Perhaps now our sales pitch no longer has to include a defense of global warming science and the resulting climate change that has already begun.



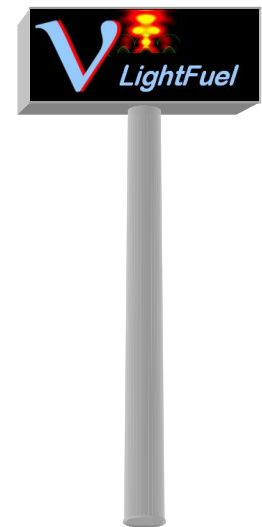
Bill Gates' Announcement. And at the Paris Climate conference, Bill Gates announced a new multi-billion dollar investment fund for developing clean technologies to combat global warming. We thank Mr. Gates for this important initiative. You can download his announcement as a .pdf in English or in French at: <https://www.gatesnotes.com/Energy/Investing-in-Energy-Innovation>. As we do, he believes solar chemical, including solar hydrogen, is first of the three "most promising" of clean technologies to develop, but that it will likely take at least a decade to

achieve. Actually, we know it takes more than a decade, which is why Nanoptek started working on our solar hydrogen technology back in 2002, or just after Mr. Gates released his Windows XP® operating system. The result is our LightFuel™ solar hydrogen solution is ready today, instead of in a decade from now. And in less than a decade, the improvements that we are working on now will result in even more efficient and lower cost solar hydrogen panels. Maybe we will call that version LightFuel™10?

And Another Patent for Nanoptek. The U.S.P.T.O. has allowed U.S. Patent Application No. 13/111,922, "Visible Light Titania Photocatalyst, Method for Making Same, and Processes for Use Thereof." The U.S. Patent will issue to Nanoptek in February, further strengthening our already substantial intellectual property portfolio for more efficient solar-driven chemistry. Additional international patent applications for this invention are pending, and one was issued last year by the Republic of South Africa. The invention continues our stress-induced bandgap engineering of titania, and potentially other semiconductors, to effect higher efficiency in sunlight. But here the stress is applied by essentially stuffing "fat" carbon or nitrogen ions into the titania crystal lattice. The resulting titania is stable but the stress from this "interstitial ion insertion" causes it to be active in more of the visible light spectrum, for highly effective cleaning of water with sunlight, or for protective performance pigment additives that absorb both ultraviolet and high energy blue light.



Nanoptek is now LightFuel. If you missed our change of name from Nanoptek to LightFuel last year, that's on us. We are—for now—a small company and marketing ourselves is not our strong suit. In 2015 our Board of Directors approved "LightFuel Company" as our Doing Business As (DBA) name effective July 4, 2015. The symbolism is no accident—Independence Day—and in a year the United Nations declared "The International Year of Light". We believe that our LightFuel™ Generators and the LightFuel™ Hydrogen (or simply LightFuel™) that they produce will eventually help us all to win our independence from the carbon economy. (The U.S.P.T.O. allowed a registered® trademark for LightFuel in 2015, which will issue later in 2016.) This re-brand focuses attention on our compelling and disruptive sunlight-to-hydrogen LightFuel™ technology and products. Nanoptek will remain our legal corporation name and will continue to be used for our non-hydrogen technologies including our Visible Light Photocatalyst™ for cleaning water, performance pigments like Nanoptek Yellow™, and our super-resolution Photon Tunneling Microscope™.



Internet of Things and Nanoptek—Back to the Future Excitement in the tech and business worlds continues to grow over what many consider the "Next Big Thing"—the so-called *Internet of Things* (IoT). This is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. Although IoT seems new, a report in 2005 by the International Telecommunication Union (ITU, the United Nations specialized agency for telecommunications), entitled "The Internet of Things"



<https://www.itu.int/net/wsis/tunis/newsroom/stats/The-Internet-of-Things-2005.pdf> came to our attention recently. The report calls Nanoptek's local hydrogen generation technology a "key innovation process" that will enable the IoT. In Chap. 5.4.3: ".....Nanoptek's hydrogen

generation technology produces hydrogen gas from water using only sunlight. This unique technology promises higher efficiency, longer life cycles, and lower cost than competing technologies for hydrogen generation. Furthermore, Nanoptek's "point-of-use" hydrogen generation reduces the problems of hydrogen transport and storage. One of the main applications of this key innovative process is responding to the common goal of producing clean, abundant, and low-cost hydrogen fuel to supply hydrogen cars using (fuel cell) engines. Both these developments could have a huge impact on the environmental performance of developing countries over the long-term, minimizing the harm of traditional non-renewable energies like oil and coal." *This report got it right in 2005, and in 2016 we're ready to go!*



Toyota's Hydrogen Announcements. In 2015, Toyota not only announced a target of 30,000 Mirai fuel cell vehicle sales by 2020, but also said their *entire fleet* will be primarily fuel cell vehicles by 2050. Thank you Toyota for your courageous vision and actions taken to achieve that vision. Of course the other important part of this vision is a clean and inexpensive source of hydrogen. That is where our LightFuel™ comes in.