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On January 14th, 2014, BlackLight Power announced a breakthrough.

With a new kind of experiment, they had achieved a power density far higher than anything they had done in twenty–four years of research. With the success of the new generation of electrolytic cells, Mills's attention had returned to water.

Typically, a water molecule is bound by electrostatic attractions to other water molecules, but if you can produce them without these intermolecular bonds, the chemical splitting of water into its constituent atoms is 81.6 eV, or 3 times 27.2 eV, the energy release needed to create an H(1/4) hydrino. The hydrogen atom dissociates from the water molecule, releasing the energy needed to break the bonds, then falls to the H(1/4) orbit with the release of one or more photons totaling another 122.4 eV (101 Å). The total release from the reaction is 204 eV.

In this scenario, you don't even need to rely on collisions for catalysis, because all the ingredients start off together in one package.

However, water does not typically exist as isolated molecules. And water molecules do not spontaneously hydrino–catalyze, thankfully for life on this planet. BLP's microwave plasmas successfully used water vapor, but Mills always ran into a roadblock when trying to scale up or increase the power density of his cells. In even his best cells, only a tiny fraction of the hydrogen was catalyzed to hydrino.

Hydrinos must be catalyzed by an atom or molecule, which usually ionizes one or more electrons; these electrons build up in the plasma, attaching to whatever they find, producing a net *charge* which causes all the species to repel one another. It limits the catalysis reaction.

Mills wondered if he put a sufficiently intense current through a conductive medium containing liquid water, perhaps he could use brute force to pull the excess charge off the water molecules and enable more reactions.

Water, by itself, is a poor conductor, but when there are free ions present in the water, such as that due to a fine metal powder, it becomes highly conductive.

BLP took water with some titanium or copper metal powder, wrapped it in aluminum foil, and placed it carefully between two electrodes of a spot welder. The sample only weights about a tenth of a gram. When they zapped the sample with ~12,000 amps of current (at very low voltage), it produces a bright flash of white light, a loud crack, and a shock wave.

Yeah, that's an *explosion*.

It brought me back to a moment, ten years before, when I was asked by Mills to do some research for a collaborating defense contractor. It would be only a few hours of work, but it forced me into a mental pause.

I reminded Mills that I had come to work for him to create technologies for the benefit of mankind, not to make us better at blowing people up.

But explosive power is good sign. If you can produce a controlled explosion, you have an energy source with a power density sufficient to generate electricity

or power a vehicle. You can replace the internal combustion engine. You can replace fossil fuels.

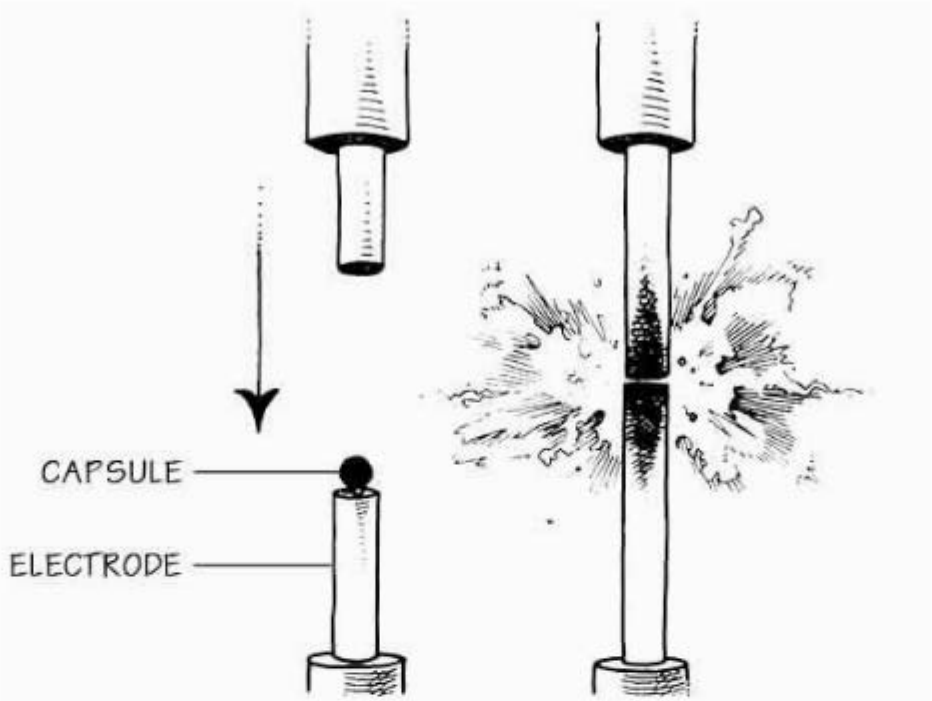
BLP quickly came up with a conceptual design for a reactor that used magnetohydrodynamic conversion to capture energy from a 1,000 cycle per second explosion occurring between rolling electrodes. They announced to the press that they had achieved "millions of watts" (BLP 2014a), though, again, the power had not yet been harnessed as electrical energy. They announced a demonstration to be in two weeks' time, on January 28th.

When the day came, BLP filled its general purpose room with investors and professionals. With the room full of observers and the cameras rolling, the upper electrode of the spot welder falls onto the capsule, and with a sharp crack the capsule is gone: vaporized instantaneously.

Mills also demonstrated the bomb calorimeter used for measuring the total energy output, as well as the spectroscopy of the light produced. In his discussion, Mills felt he had finally demonstrated that quantum theory was invalid, as there was no quantum chemistry in the pellet that could produce an explosion of *any* kind.

"You can't prove a theory," Mills admitted, "but you can *disprove* a theory by experiment."

And he had done just that.



EXPLOSIVE POWER

APPARATUS USED TO GENERATE MICRO-EXPLOSIONS. HIGH CURRENT IS PASSED THROUGH 100mg CAPSULES CONTAINING WATER AND METAL POWDER. THE BLAST INSTANTLY VAPORIZES THE CAPSULE.

BLP's hydrated powders included titanium (Ti), copper (Cu), aluminum (Al), or gold (Au) often in combination with their oxides (TiO, CuO, AlO). Ti and Au was used in combination with magnesium chloride and zinc chloride.

In the best reported reaction, 70 mg of titanium powder with 30 mg of water produced a net excess energy of 866 Joules, a power gain of 7. That's 8,660 J/g from the sample, or twice the energy output of TNT after totally subtracting for the input power. Not all of the input power needs to go into the sample,

but to be conservative we subtract it all. Also, since the titanium is recoverable, the consumed weight in the reaction is only the water (30%) although we will ignore this too in our calculation. Since the reaction takes place in less than a millisecond, the power output from the reaction is astonishing: at least 8.6 MW/g (Mills 2014).

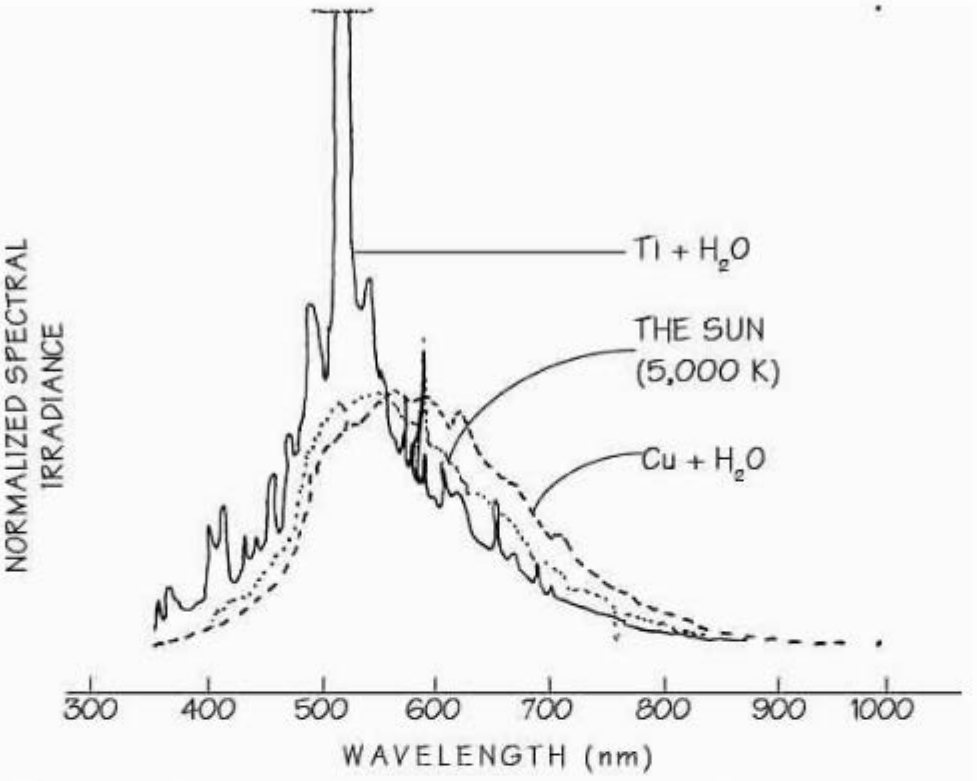
It appeared that Mills had found a way to overcome the rate–limiting processes and take hydrino catalysis to completion; all of the hydrogen in the sample was being catalyzed *at once*.

They made sure they were making $H_2(1/4)$ two ways: they found a Raman peak that corresponded to the rotational energy of H_2 (1/4), and they found an XPS peak that corresponded to the double ionization energy of H_2 (1/4), a peak that has no previously known assignment.[7]

Most of the energy released from the process is in the form of light. To the naked eye, the light is difficult to see, because most of it is emitted in the EUV, and absorbed very quickly by surrounding gases.

In one experiment, BLP allowed the gases from the explosion to expand into a larger vacuum chamber. As the gas expanded, it became optically "thin," allowing it to be analyzed. Although the burst of current occurred only over one microsecond, the gases continued to emit light over 19 microseconds, as they expanded from the source at supersonic velocity.

Amazingly, the emission spectrum revealed that the gases were at a temperature of over 5,000 ° C, closely matching the temperature of the surface of the Sun (Mills 2015). It was also good match for a broad 587 Å peak seen in the



THE SPECTRUM OF THE SUN COMPARED TO THE SPECTRUM EMITTED BY THE EXPLOSION OF FOIL CAPSULES OF WATER AND METAL POWDER IN 11,000 AMPS OF APPLIED CURRENT. AFTER (MILLS 2015).

Although the first concept for a reactor involved directly capturing the energy of a high–velocity ionized plasma with magnetohydrodynamic conversion, they soon realized that more of the energy was being released as *light*.

There was a moment of illumination. Why not use *solar cells*?

It was a breakthrough that would massively simplify the engineering. "It is a gift from Nature" Mills excitedly told an audience at a demonstration. But it was

also a gift from man; we had been developing solar cells for decades, investing billions of dollars in the effort to manufacture them inexpensively. Of course, they were typically used at the moderately low energy density of natural sunlight, but concentrator cells had also been developed that could take thousands of times more light and convert it to electricity at a much higher efficiency. It was as if the world had been preparing for the hydrino for thirty years.

A sun in a box.

I laughed with surprise when I heard this. In the demonstration, BLP equipped their semicontinuous system with a box of solar panels and a 70 W LED bulb. As the explosions rolled off the wheels, the lights went on.

BLP released a new conceptual design showing a 50 MW generator with internal solar panels capturing light from a continuous reaction. It was obviously conceptual, and problems remained to be solved; they hoped that a water–powder mixture could simply be dropped through the rotating electrodes, and it was unclear how they would recover and reuse the metal that was vaporized in the blast.

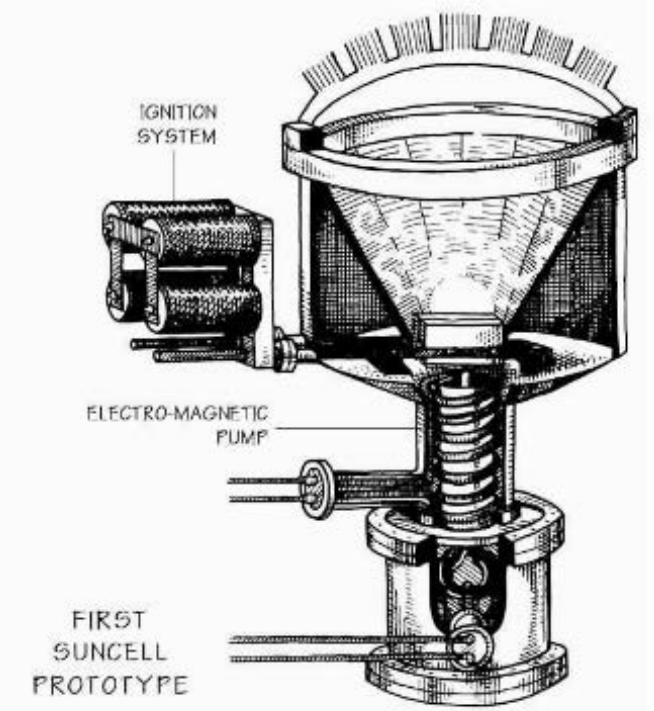
Another problem was that the reaction primarily released light in the EUV and soft X–ray, which would require some kind of conversion to emit in the visible spectrum, which is the range of wavelengths our solar cells have been designed to capture. Details remained to be worked out, but it was an exciting concept to investors, and it seemed that all that was left was engineering. They raised another 11 million dollars to continue development.

Mills called it the *SunCell*.

In January of 2016, two years from the first demonstration of the explosive reaction, BLP again hosted a public demonstration to show off its latest prototype. They had found a solution to a sustained reaction. Mills also announced a new name change: *Brilliant* Light Power.

"We've been very busy…" Mills explained, "and we did a lot of work, had trials and travails. Some led to innovations, some led to other ideas, some were a total waste of time. That's the way it is in science and engineering" (Mills 2016).

In a breakthrough experiment on November 14th, 2015, they had injected water vapor into molten silver and poured it between tungsten electrodes, hitting it with rapid bursts of current. The intensity of hydrino catalysis *vaporized* the silver as it passed through. They found they could create, and sustain, a brilliant glow.



WATER VAPOR IS INJECTED INTO A MOLTEN SILVER-COPPER ALLOY THAT IS PUMPED BETWEEN TUNGSTEN ELECTRODES AND INJECTED WITH RAPID BURSTS OF CURRENT, PRODUCES A SUSTAINED BRILLIANT EMISSION OF LIGHT, PRIMARILY IN EUV AND X-RAY BANDS. THIS LIGHT MAY THEN BE CONVERTED INTO THE VISIBLE SPECTRUM AND CAPTURED WITH SOLAR CELLS (NOT PART OF PROTOTYPE).