

THE ELTRON QUARTERLY

Eltron Research & Development Updates

February 2011: Winter Issue

Eltron Research & Development

Eltron Awarded \$70 Million to Scale Up Clean Energy & Chemicals Process

Eltron Research & Development, Inc. has received a contract from the U.S. Department of Energy to accelerate and scale-up their advanced membrane process technology which reduces the capital and operating costs of capturing carbon dioxide while producing industrial hydrogen from various feed stocks including coal, biomass and natural gas. The \$71.38 million award is funded by the American Recovery and Reinvestment Act.

The accelerated development and scale-up effort is currently in the site selection phase for the construction and operation of a large, pre-commercial demonstration plant. Upon completion of this program Eltron will be ready to license the process to industry for commercial implementation.

This project offers the potential to reduce the cost of clean power from domestic energy sources. Eltron's begun work under this program and has already increased their staff by 10% and has plans to grow by another 10% over the next year.



Eltron's Hydrogen Membrane project continues to make progress.
In the picture above is the pilot 12-lb/day unit that was designed and fabricated by Continental Technologies and is now located at Eltron's partner Eastman Chemicals in Tennessee.

A Note From Paul Grimmer, Eltron R&D's President

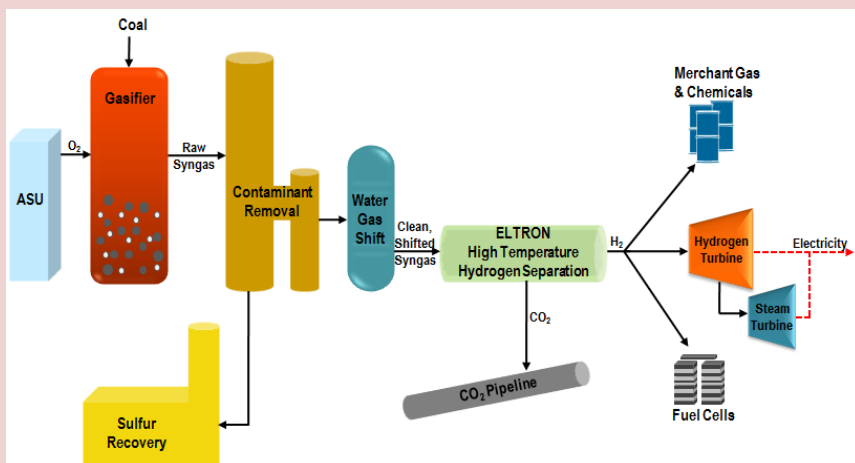
This is our second quarterly newsletter. I hope you find them useful and informative.



This quarter's feature story is about the DOE grant which will greatly accelerate the commercialization of one of our clean coal technologies. There are a number of efforts globally to capture CO₂ from the boiler exhaust of existing coal-fired power plants. Our system is designed to make and then capture CO₂ before any combustion occurs, leaving pure hydrogen gas to be used for combustion. The DOE's target for new technologies is to be able to capture 90% of the CO₂ made in a power plant. Our process will enable virtually all of the CO₂ to be captured.

We started this program a decade ago when the "hydrogen economy" was the rage. Our hydrogen membrane was going to allow us to make H₂ from coal which would then feed fuel cell systems in distributed power systems, vehicles, etc. Commercially-available fuel cells were about 5 years away. Unfortunately they are still 5 years away and I wouldn't be surprised that in 2020 they will still be 5 years away. But it dawned on us that with existing technologies we can make coal-derived synthesis gas into H₂ and CO₂ and since our membrane lets us split off the H₂ then we also were doing CO₂ capture.

We make extremely pure H₂ and if/when



Picture: High Efficiency, IGCC Plant with Carbon Capture

Interested in learning more about our Hydrogen Membrane Technology?

New Whitepaper: [Hydrogen Separation Membranes Applications](#)

fuel cells ever do make it to the market in a big way we'll be ready. In the meantime we will be focusing on developing a system that captures CO₂ that just happens to make pure H₂ as well.

We are evaluating other applications for the system. For example, natural gas fired power plants produce about 1/3 the CO₂ as coal-fired plants but this is still a large amount. In refineries and petrochemical plants there are many places where H₂ recovery during or after a reaction is desirable.

We are always looking for industrial partners for our products and technologies. Whether it is H₂ recovery, CO₂ capture or any of the other technologies we have, please let us know if you think there might be a fit with what you are trying to do.

Sincerely,
Paul Grimmer

Meet Our Scientist/Engineer

Eltron R&D is located in Boulder, CO. The majority of its residents are very outdoorsy and active, so it should come as no surprise that the majority of our staff have pretty interesting hobbies involving this location. Every quarterly newsletter, we will randomly choose an Eltron scientist or engineer to spotlight. This quarter, meet Jim Fisher.

Q: What do you do at Eltron?

JF: I've worked at Eltron for the past 8½ years. I am a chemical process engineer and basically design whatever the "bossman" wants me to work on.

Q: I hear that you are an avid runner?

JF: For the past 20 years, I've been a high altitude, long distance, mountain trail runner – an "ultrarunner". I've completed 12 100-milers, over 20 50-milers, and have done a 26+ month streak and a 34 month –10 day streak. In runner's terminology, a streak means not missing a day of running, and in my case this was a 2 mile day minimum requirement. As part of my typical training, I would run 2 hours a day, 6-7 days a week, from snow melt till snow fall, out of the Santa Fe ski basin (10,500' at bottom & 12,000' at top).



Recently Awarded Projects

The projects below have been selected or are being considered for award and are in the process of negotiation to be awarded.

- **NASA – SBIR Phase 1 – First Principles Identification of New Aircraft Materials**
- **NASA – SBIR Phase 1 – Inorganic Nanostructured High-Temperature Magnet Wires**
- **NASA – SBIR Phase 1 – Wide Temperature Range Hybrid Energy Storage Device**
- **NASA – SBIR Phase 1 – Novel High-Temperature Pressure Sensors for Extreme Service Applications**
- **EPA – SBIR Phase 1 – A Solvent-Free Nanopowder Production Method**
- **DOD – SBIR Phase 1 –**

Q: Impressive! Any other hobbies?

JF: Well, in between running I collect minerals (live and on the hoof). I've also quite naturally been into scenic photography, and as a true chemical engineer have had my own wet chemistry darkroom. In Boulder, I squeezed in 5 years as a regular member of a drum circle. Also, I was a core member of a canoe club for several years, which means I organized and lead canoe outings. Recently, I've taken up Anusara style yoga. Contrary to my ignorant and arrogant initial opinion as an ultrarunner, yoga is NOT for wimps.



Q: Can you share with me a little about the personal scientific project you've been working on for a long time?

JF: In between my work and running, and often during my solo training runs, I have worked on my own private mathematical physics project, also for 20 years now. I found mathematical equations to explain the elementary charge of the electron, the masses of the electron, muon, and tau, the Planck's constant, and now recently the ternary force constant. These equations set obvious logical interlocking patterns. Each of their parts (terms or factors) can be assigned plausible real world meaning and often point toward real world physical property information. And of the most major significance, the equations only require 3 dimensional spatial geometry and can be easily understood by a person with at most the knowledge of second semester calculus.

See more on Jim's Project: www.eltronresearch.com/specresearch.html

Development of a Nanothermite-Based Propellant Initiator for Army Munitions

- **HHS (CDC/NIEHS) – SBIR Phase 1** – Process for Removal of Microcontaminants from Municipal Water

Interested in seeing what other projects are going on at Eltron?

Check out our "[Book of Stuff](#)".

Upcoming Events/Conferences

- **Feb. 28-March 1** – ARPA-E Energy Invitation Summit (exhibiting as an ARPA-E finalist)
- **March** – Canadian Clean Power Coalition (presenting on carbon capture technology)
- **March 28-31** – 2011 Membrane Technology Conference and Exposition – Long Beach, CA (attending)
- **May 10-12** – 12th Annual Small Business Conference & Expo – Kansas City, MO

Philanthropy: Movember

When "Mo" (slang for mustache) & November come together...

During the month of November this year, several Eltronians sprouted their facial hair (mustaches to be specific) to support Movember, which raises funds and awareness for men's health, specifically prostate and testicular cancer. In addition to not only sporting stellar 'staches, the company helped raise funds that go directly to the Prostate Cancer Foundation and the LIVESTRONG Foundation.



Pictured: Eltron "Mo-bros" Dan Riffell, Andy Del Negro and Nic Jentzsch

Eltron Winter Feast

Eltron employees and their families gathered together in December to celebrate the holiday season at the annual Eltron Winter Feast. Towards the end of the feast, the group of 10 Eltron musicians (known best as *Symphotron*) entertained their colleagues and their families with several classic holiday tunes.



Fort Love Jazz Orchestra

The Fort Love Jazz Orchestra, one of Northern Colorado's newest bands, put on their first show entitled "The Nightmare Before Christmas" on Nov. 11, at the Agave Room in Fort Collins. The show was a hit which over 250 people attended. Out of the 12 Fort Love Jazz Orchestra band members, 4 are Eltronians. Pictured: Dave Gribble (alto saxophone), Sara Rolfe (organizer and trombone), Emily Grimmer (French horn) and Alana Rolfe (viola).



Eltron Contract R&D Services:

- Proof of Concept Chemistry
- Prototype Development
- Process Development & Modeling
- Engineering & Economic Analysis
- Catalyst Design, Synthesis, Scale-up and Evaluation

To learn more about these services:

[Contract Services Brochure](#)

About Eltron Research & Development

Eltron is a leading R&D organization with a 30-year history of providing technology solutions to the energy and chemicals industries. Eltron's scientists and engineers have generated over 70 patents based on technology developed at the company's world class research facility in Boulder, CO.

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An advertisement for Continental Technologies. The top left features the company logo with the text "CONTINENTAL TECHNOLOGIES". To the right, it asks "Are You Planning to Scale Up Your Technology??" Below this is a photograph of a complex industrial pilot plant. A yellow sign in the foreground lists services: "Services include: FABRICATION, DESIGN, ENGINEERING, INSTALLATION, TRAINING, OPERATION". At the bottom, a blue banner contains the text "Inspiration to Operation", "CUSTOM FABRICATED PROCESS EQUIPMENT", and contact information: "303.530.0263 x. 152" and "www.contechfab.com".

"Design, Build & Operate Pilot Plants"