

### Magnetic Power Transmitter for Charging Batteries



Eltron R&D has developed a new method for transmitting power over distance without the use of wires. Originally, this technology was developed for the Navy to charge the batteries in soldiers' backpacks all at once without having to plug each one into a charger. The ultimate goal of that project was to create a centralized power station with a power transfer efficiency of greater than 75% over at least 3 meters.

Mike Pierce is the inventor and he is featured in this issue's "Meet Our Scientist/Engineer" section on page 2.

This technology has a myriad of uses outside of the military including wireless charging of the various electronic devices in use today such cell phones, laptops, iPads, watches and hearing aids.

It appears that the method power transmission does not harm living tissue so it may be able to be used with implantable devices such as heart pumps, insulin pumps, pacemakers, etc. Perhaps a patient has a transmitter located under her bed and while she sleeps her internally-implanted devices recharge automatically. That's pretty exciting.

Eltron's system will yield:

- Power output between 100W and 150W
- Operating frequencies between 50Mhz and 1 Ghz
- An effective distance of 6 meters at 50 Mhz and 100 W
- The ability to charge NiCad, LiIon and Li-Polymer batteries
- Power transfer efficiency of greater than 75%

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

I hope everyone has safe and happy holidays and a prosperous New Year.



This month we are highlighting Mike Pierce who is an electrical engineer. He is our only full-time EE; we have another, Chris Marotta, who has a BS in EE but a PhD in Chemistry and he is mainly a Chemist. Most of the technologies in Eltron are chemically-based whether they are new catalysts, membranes or just new materials. We have several electrochemists who deal with electrons but even those are generally for making some chemical reaction occur.

Mike originally came to Eltron to support chemists who invented new chemical sensor materials; they needed someone to wrap the power and electronics systems around their sensing elements to turn them into something useful. For a variety of reasons we have de-emphasized our chemical sensor work in recent years. I was concerned that we might not have enough work to keep Mike busy. We didn't but an amazing thing happened. This guy who we didn't have in an inventive role started having lots of ideas for new widgets. Perhaps those ideas were there all along and we didn't have him in a role where he felt he could express them, I don't know. Perhaps it was just that he some extra time to think up these ideas. Perhaps it was the encouragement we gave him to express his creativity. It was probably some of all of the above.

I have learned a great lesson working with Mike in recent years. I knew he was a very smart guy but I had also assumed that he was not very creative. I have always considered myself to be a good judge of people and their abilities. Mike has forced me to rethink that assumption because I was totally wrong with him. (As an aside, for those of you who know me, you know how hard it is for me to admit that I was wrong about anything so this must have really been an amazing

- Independent receiver orientation.

We have only been working on this technology for about 6 months. Accomplishments to date include:

- Successfully charged two 1.2V 1000ma NiCad batteries in series from 3 meters.
- Charging current and voltage for test batteries was 25.74 milliamps and 3.2 volts.
- Transmitter power output reached 12 watts.
- Magnetic field strength at reception antenna at a distance of 3 meters was estimated to be  $16\mu\text{V}/\text{m}^2$ .
- Novel pulse/burst charging cycle shown to break up dendrite formation leading to extended battery life.

Please contact us if you or your company are interested in developing products based on this technology. We are looking for development partners.

insight...). On a daily basis now I revisit assumptions that I have made over the years about family, friends work colleagues, subordinates etc. and I am finding that many of my pore-conceived notions are wrong, or at least incomplete. People are amazing. Sometimes all it takes to unleash hidden capabilities is a kind word, a pat on the back, expressing some trust or confidence in the person, etc.

I rarely write like this but as I was thinking about what I could write to accompany the write-up on Mike, it occurred to me that this eye-opening experience I have had was what really hit me about him and I hope that my sharing of this with you will encourage you to perhaps look at the people you know in a different light.

Sincerely,  
Paul Grimmer

## Meet Our Scientist/Engineer

*In each quarterly newsletter, an Eltron scientist or engineer will be featured. This quarter meet: **Michael R. Pierce.***

**Q:** Mike, how long have you been working at Eltron and what do you do?

**MP:** I started working at Eltron in May of 2002. I am an EE (Electrical Engineer) and I design electrical circuits and instrumentation depending on what's needed. Currently, I'm working on a magnetic antenna that will broadcast a magnetic wave-front that charges electrical devices.



**Q:** Do you always think you've always been "wired" to be an EE?

**MP:** Oh yes, I have always been fascinated and playing with electronics since I was about 7 or 8 years old.

**Q:** Most people at Eltron know you are a family man. Can you tell me a little about your wife, children, and pets?

**MP:** Well, I've been married to Angel for 31 years now. We met on a church bus – we were both teaching Sunday school at the time. The moment I met her, I thought "this one is special" – for her though, I think she initially thought I was a dork... of course

## Eltron's Annual Safety Picnic

Eltron employees and their families gathered on September 24, 2011 to celebrate another safe and accident free year at Eltron E&D.

As a new twist for this year's grilling, Andy Del Negro, (Eltron's Second Year "Grill-Miester") incorporated a few Bio-Briquets to the charcoal mix. These Bio-Briquets were made from bagasse (left-over sugar cane) and made by Eltron's most recent spin-off company [The BioCompactor Company](#).



*Senior Chemist, Andy Del Negro, lighting a mix of Bio-Briquets and charcoal at this year's Safety Picnic.*

I eventually grew on her as time went by and the rest is history! We have 4 children. The oldest is my son Jason who is married and has three children of his own. The next is my daughter Charity who is a freshman in college majoring in nursing. The two youngest are my 15 year old twins, Hanna and Benjamin, who are in high school. And finally, pets, we have 2 rabbits named Snowball and Woodstock. Snowball is all white with black coloring around his eyes – I've always thought that Bandit would have been a better name for him.

**Q: What are your hobbies outside of work?**

**MP:** Anything outdoors – primarily fly fishing, hiking in Rocky Mountain National Park and hunting elk and deer. Once while hunting around the Colorado-Wyoming border, I was on my way back from following an elk's tracks and I noticed that on top of the elk's tracks were mine (which made sense) but then on top of my tracks were bear tracks, and on top of the bear tracks were cougar tracks. I guess we were all hunting each other that day!

**Q: What are your 3 favorite foods?**

**MP:** I love fish! Although I love to eat all different kinds, my three favorites are halibut, shrimp, and sushi in general.

### **Fire Extinguisher Training**

On October 5<sup>th</sup>, Eltron had a company-wide fire extinguisher class involving live fire. The training covered basic fire extinguisher use and safety, and each employee got the opportunity to discharge a fire extinguisher to put out a small flammable liquid fire. "We try to run through this type of training every couple of years, and everyone did a great job this time around," said Dan Riffell, who is Eltron's Environmental Health and Safety Coordinator.

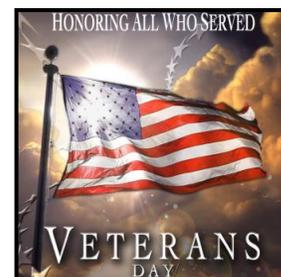


*Research Associate, Danny Dubuisson, uses the sweeping motion to extinguish the controlled liquid fire in the Eltron parking lot.*

### **Veteran's Day**

About 10 out of the 50 Eltron staff are musicians (roughly a fifth of the company). So naturally, Eltron formed a group called "Symphotron" which gathers periodically throughout the year to take out their instruments and play through songs together.

For this year's Veteran's Day (11-11-11), the group gathered to play some patriotic tunes and honor those who have served, including fellow coworkers, relatives and friends.



Directed by Symphotron Leader, Lee Henton, some of the songs performed were:

- America the Beautiful
- The Star Spangled Banner
- An Armed Forces Medley

### **Eltron Welcomes Abbie Gade**

Abbie joined the Eltron team in September 2011 and is working on Eltron's hydrogen membrane project.



Abbie's previous work has been with proton-conducting cermet membranes and solid oxide fuel cells.

She also has worked with direct methanol fuel cells and the desulfurization of liquid fuels.

She has a B.S. in Chemical Engineering from CU and a Ph.D in Chemical Engineering from Colorado School of Mines.

Her thesis research dealt with palladium-alloy membranes for sulfur-tolerant hydrogen separations.

## **Contract R&D: Catalyst Design, Synthesis, Scale Up & Evaluation**

Eltron has developed hundreds of catalysts – heterogeneous and homogeneous, supported and unsupported – during our research. Our catalyst development services include:

- Evaluating activity, structure and impurity
- Directing research for more rapid characterization and optimization
- Scaling recipes to multiple ton quantity
- Refining the methodology for repeatable production (in the lab and at commercial volume)
- Testing capabilities
- Helping ensure performance without sacrificing activity, selectivity or durability
- Poisoning and deactivation analysis

Eltron can provide advanced catalysts based on a variety of materials (acids/bases, metal oxides, ceramics, molecular sieves and mesoporous materials, metals/supported metals, carbides, nitrides, sulfides, and organometallics) and for a range of applications.

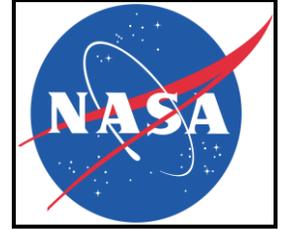
*Want to see more about these services?*  
[Eltron's Contract Services Brochure](#)



## **Recently Awarded Projects**

The project below has been selected or is being considered for award and is in the process of negotiation to be awarded.

- **NASA** – Phase I – Catalyst for Ignition of Non-Toxic Monopropellants



## **Book of Technologies**

Eltron has been constantly inventing technologies since its inception in 1982. Some of the diverse tech briefs in [Eltron's Book of Technologies](#) include:

- Electroporation of Algae Cells
- Catalysts for Complete Oxidation of VOCs at Low Temperatures
- Peroxegen On-Site H<sub>2</sub>O<sub>2</sub>/PAA Water Treatment System
- Ammonia Sensor Helps Maximize Livestock Production
- Eltron's Low CO<sub>2</sub> Emission Fischer-Tropsch Catalyst
- Room Temperature Ionic Liquid
- Advanced Monitoring for Hypergolic Leaks

## **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 50 scientists and engineers have generated over 70 patents based on technology developed at the company's world class research facility in Boulder, CO. Since 2007, Eltron R&D has spun-out 3 separate companies: [Eltron Water Systems](#), [Continental Technologies](#), and [the BioCompactor Company](#).

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Continental Technologies, an affiliate of Eltron R&D, helps transform concepts into prototypes and pilot-scale systems for many applications. Learn more at: [www.contechfab.com](http://www.contechfab.com)