

# ESA Newsletter

Electrostatics Society of America - The Friendly Society

## President's Message

When the temperature drops, snow starts flying and the indoor humidity drops, we know we're heading into what is known as "static season" in the industrial world. Situations that aren't a problem when the humidity is over 50% now start rearing their ugly heads in all sorts of industrial situations including electronic assembly, converting (film) machines, powder handling and many other material handling situations. When you are in the instrumentation or consulting business, or if you're the resident electrostatic expert, this is the time of year you earn our keep. I sometimes think if most of the industrial production was in the tropics, in non-air conditioned facilities, a number of us would be out of work. This should make us thankful for our long, cold and snowy seasons, year after year up north. (Try to keep this in mind as you dream of moving to a warmer area of the country.)

Kelly Robinson is right on top of the 2004 ESA Conference in Rochester. We're looking forward to welcoming everyone here to enjoy our wonderful

June weather, (another thing to keep in mind as we head into another long, cold winter). The 2005 conference is going to be in Edmonton, Alberta at the University of Alberta, hosted by Angela Antoniu. Angela has graciously volunteered and is excited to have us in the farthest north conference yet to date. (I bet they have some serious electrostatic problems that far north in Alberta.)

I have a question that I'd like an answer to. I've seen articles that discuss the hazard of using a cell phone while operating a gasoline pump. Does anyone have any idea of the ignition mechanism in this situation? I can't seem to come up with a satisfactory answer and would appreciate some input if anyone has some good ideas. Please forward your thoughts to either Mark Zaretsky or myself for inclusion in the next newsletter.

Happy Holidays to Everyone and remember to enjoy the static season!!

*Bill Vosteen*  
ESA President

2004 ESA Annual Meeting - June 23-25, 2004  
Rochester Institute of Technology (RIT)  
Rochester, NY

Abstract Deadline: Feb. 25 (see inside for details)

## Current Events

### High-Efficiency, Low-Power Air Filtration System Using a Charged Liquid

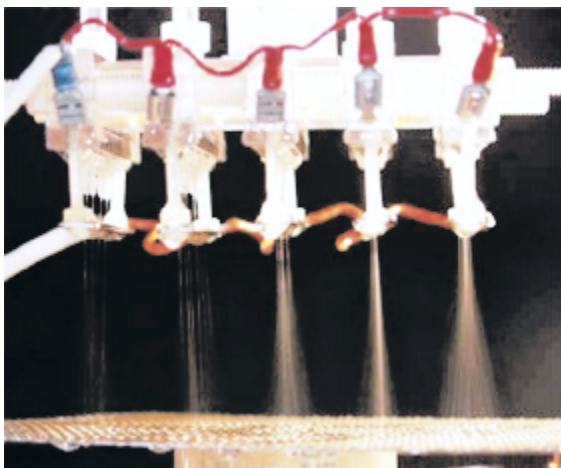
This air filtration system removes particulates from an air stream by using charged particles of a non-aqueous, non-evaporative fluid. The positively charged droplets attract dust particles from the air that have been given a slight negative charge by a corona charger. A grounded (negatively charged) bowl receives the droplets, which clean the grounded surface automatically. The system recycles the liquid for reuse.

The nozzle is an electrohydrodynamic sprayer. No pressure is required for the system other than to deliver the liquid to the charging nozzle, where the system charges it at 5-20Kv. The charging creates the droplets from a few to a few tens of microns in diameter. Given the density of the droplets as they cross the gap between nozzle and charged bowl, 98% of space they pass through is still void. This results in minimal back pressure in the system, unlike a HEPA filter. However, 1ml of the spray liquid in the form of 20- 30-micron droplets produces a filtering surface area of 1 square meter. The spray is efficient from .1 to .3 microns, which mimics the efficiency of a HEPA filter.

A HEPA filter typically produces a back pressure of 2-3 inches of water column—which the charged particle air filtration system does not. This has a bearing on the eventual applications for the system.

Droplets are compatible with additives such as antimicrobials, and even perfume.

The air filtration system has a low power requirement because it takes very little power to charge the liquid, and because the system does not need to overcome the back pressure that a HEPA filter would produce. The high power that HEPA filters require can result in a noise level of 60-70dBa. The electrostatic air filtering system has a noise level of about 40dBa, comparable to that of home air conditioning.



A single-nozzle spray can remove 99% of the particulates in the

air stream. The same low voltage can serve a multiple-nozzle array.

for more info. check

<http://www.yet2.com/app/list/techpak?id=30526&sid=90&abc=0&page=details>

### Patent Awarded for Method of Making Nanobatteries

(courtesy of Matti Murtomaa)

A University of Tulsa chemistry professor and two former students have been awarded a patent for a method of making nanobatteries for use in tiny machines similar to the microbe-size craft that traveled through a human's blood vessels in the 1966 science-fiction movie, "Fantastic Voyage."

U.S. Patent 6,586,133 was awarded July 1, 2003, to chemistry professor Dale Teeters and to Nina Korzhova and Lane Fisher, who were both chemical engineering students at TU when they worked on the process to manufacture nanoscale microscopic batteries. One nanometer is one-billionth of a meter. The diameter of an average hair is 50,000 nanometers. The invention is a manufacturing process that can build, charge and test nanobatteries.

So far Teeters and his researchers have made batteries that are so small that more than 40 could be stacked across the width of a hair -- and they continue to make even smaller batteries.

The method includes use of a porous membrane, filling the pores with an electrolyte, and capping the pores with electrodes. Conventional batteries have two electrodes that deliver the charge and an electrolyte through which charged ions move.

The manufacturing process begins with an aluminum sheet that is placed in acid solution under an electric current, resulting in an aluminum oxide membrane. When the metal is dissolved, a honeycomb structure results. The pores are then filled with an electrolyte -- comparable to the liquid in a car battery -- which in this case, is a plastic-like polymer. Next the filled pores are capped on both sides with electrodes -- ceramic or carbon particles -- similar in function to a car battery's lead plates and two posts.

Key tools in the process are a scanning electron microscope and an atomic force microscope, which can observe and manipulate particles as small as molecules -- and is used to charge the microscopic array of batteries. Each battery packs as much as 3.5 volts. The microscope's custom-made electrically-conducting cantilever tip is

## Current Events

touched to the electrode so that the battery can be charged and tested.

*excerpted from*

<http://www.newswise.com/articles/view/?id=500572>

### Protective Outerwear

Most of the time we think of protective outerwear in terms of providing ESD protection by preventing charge build-up.

Think again!! Here is protective outerwear designed to deliver high voltage shocks (80kV from a 9V battery) and provide human protection.

“According to the Senate Judiciary Committee, three out of four women in the United States will be victims of one violent crime during their lifetime.

The No-Contact Jacket is a wearable defensive jacket created to aid women in their struggle for protection from violence. When activated by the wearer, 80,000 volts of low amperage electric current pulses just below the surface shell of the entire jacket. This exo-electric armor prevents any person from unauthorized contact with the wearer's body.

If an assailant were to grab hold of the wearer the high voltage shocking exterior would interrupt their neurological impulses which control voluntary muscle movement. The neuromuscular system would be overwhelmed causing disorientation and loss of balance to occur and of course pain. The pain experienced is non-lethal but is enough of a shock to effectively and immediately deter contact with her body and provide a critical life saving option for escape.”

*for more information* <http://www.no-contact.com/index.html>

### More Reliable Drug Delivery

*BattellePharma, Inc.*

Infant inhalers are critical medical devices that parents rely on to ensure that the proper amount of medicine is delivered to their children. Dose variation and delivery efficiency are important characteristics of these devices where the quality and size of the specific dose delivered is more sensitive in children than it is in adults.

A research team at Battelle and BattellePharma, both of Columbus, Ohio, has developed a new device that makes dramatic improvements upon the existing technology to provide consistent drug dosages, efficient drug delivery, and at a reasonable cost. When compared to competitive devices, the Mystic Infant Inhaler has a dose variation of less than 10% versus more than 15% on other devices. The delivery efficiency (the amount of medicine the

patient receives relative to the specified dose) of the Mystic Infant Inhaler is greater than 80% compared to only 10% on current devices and about 60% for other still unavailable emerging technologies. That means that infants get more consistent dosages from dose to dose.

Other characteristics include a more consistent particle size in the mist delivered to the patient, a more manageable device size (hand-held), and cost substantially below that of other technologies (\$6 vs \$30 to \$200).

The design of the device is based on electrohydrodynamic (EHD) aerosolization, a process that produces a cloud of uniformly sized particles that are easily distributed to the lungs without the need for propellants or other pressurized systems.

*for more information*

<http://www.battellepharma.com/pubs/spain.pdf>

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## Current Events Calendar

- ✦ ESA 2004, June 23-25, 2004, Rochester, NY, Contact: Kelly Robinson, email: [kelly.robinson@kodak.com](mailto:kelly.robinson@kodak.com) , website: <http://www.electrostatics.org/Announcements/2004%20Call-For-Papers.htm>
- ✦ 5th international Electro-Hydro-Dynamics Workshop, August 30-31, 2004, Poitiers, France, Contact: Hubert Romat, email: [hubert.romat@lea.univ-poitiers.fr](mailto:hubert.romat@lea.univ-poitiers.fr) , website: <http://labo.univ-poitiers.fr/informations-lea/EHD/pl.html> (**NOTE: abstracts due April 30, 2004**)
- ✦ 4th French Electrostatics Society (SFE) Congress, September 2-3, 2004, Poitiers, France, Contact: Gerard Touchard, email: [gerard.touchard@lea.univ-poitiers.fr](mailto:gerard.touchard@lea.univ-poitiers.fr) (**NOTE: abstracts due April 30, 2004**)
- ✦ EOS/ESD Association 26th Annual Symposium, September 19-23, 2004, Grapevine Texas, email: [info@esda.org](mailto:info@esda.org) , website: <http://www.esda.org> (**NOTE: abstracts due April 30, 2004**)
- ✦ Electrostatics 2005, June 15-17, 2005, Helsinki, Finland, Contact: [electrostatics2005@congreszon.fi](mailto:electrostatics2005@congreszon.fi) , website: <http://electrostatics2005.vtt.fi/> (**NOTE: second call for papers - abstracts due May 28, 2004**)

## CALL FOR PAPERS

# 2004 Electrostatics Society of America Annual Meeting

June 23-25, 2004

Rochester, New York USA

The 2004 Electrostatics Society of America (ESA) Annual Conference will be held on the campus of the Rochester Institute of Technology (RIT) in Rochester, New York from June 23-25, 2004. Join us for our technical sessions including comprehensive technical papers, a Student Paper Competition, informal discussions, poster sessions, and electrostatics demonstrations.

### TOPICS OF INTEREST INCLUDE:

- ✓ Atmospheric Electricity
- ✓ Biological Applications
- ✓ BioMEMS and BioFluidics
- ✓ Breakdown and Discharges
- ✓ Charge Neutralization
- ✓ Computational Methods
- ✓ Display Devices
- ✓ Electrets
- ✓ Electrohydrodynamics
- ✓ Electrophotography
- ✓ Electrostatic effects in drug delivery
- ✓ Electrostatic Painting
- ✓ Electrostatic Powder Coating
- ✓ Electrostatic microencapsulation
- ✓ Electrophoresis
- ✓ Electroviscous effects
- ✓ Electrostatic Printing
- ✓ Electrostatic Propulsion
- ✓ Electrostatics Demonstrations
- ✓ Electrostatics Education
- ✓ ESD Prevention and Detection
- ✓ MEMS Devices
- ✓ Nonthermal Plasmas
- ✓ Nanoelectrospray applications
- ✓ Particle Control & Transport
- ✓ Precipitators and Cleaners
- ✓ Safety and Hazards
- ✓ Sprays and Droplets
- ✓ Triboelectrification

### DEADLINES:

- February 25, 2004** Titles, abstracts and name of 1 - 2 relevant subject area from the list above are due to <http://www.electrostatics.org>
- Mid - February** Registration and detailed conference information will be available at <http://www.electrostatics.org>
- March 5, 2004** Notification of Paper Acceptance
- April 15, 2004** Final Manuscripts Due. Instructions for authors are available at <http://www.electrostatics.org>, along with templates for MS Word and Latex.

✓ Authors may request that their manuscript be considered for publication in the Journal of Electrostatics.

### STUDENT PAPER COMPETITION:

To encourage participation by student researchers, all presentations (either in the main session or poster session) that have a student as the presenter and first author will be considered for the student paper competition. Undergraduate and graduate students are eligible. Papers will be judged on their technical merit and the cogency of their presentation. Please indicate at submission that the abstract is to be considered for the student paper competition, and list all student authors.

Contact the General Chair for information regarding transportation and accommodations, or the Technical Chair for information regarding the technical sessions:

Kelly Robinson (General Chair)  
Electrostatics Group, Global Mfg. Tech. Org.  
Bldg. 23, Rm. 364, KP Eastman Kodak Company  
Rochester, NY 14652-4317  
Tel: 585-477-4951 Fax: 585-477-1151  
E-mail: [kelly.robinson@kodak.com](mailto:kelly.robinson@kodak.com)

Sheryl Barringer (Technical Chair)  
The Ohio State University  
317 Parker 2015 Fyffe Ct.  
Columbus, OH 43210-1007  
Tel: 614-688-3642 Fax: 614-292-0218  
E-mail: [barringer.11@osu.edu](mailto:barringer.11@osu.edu)

## Sources & Sinks

### Ben Franklin Mini Review

During the last few months two very nice short articles have been published on Benjamin Franklin. One is very interesting on the historical side - [Benjamin Franklin Joins the Revolution](#), Smithsonian, August 2003. The other (my favorite), more scientific, [Benjamin Franklin, Civic Scientist](#), Physics Today, October 2003.

The first has many gems. Did you know that Franklin proposed, instead of a president, a 12-person executive council? Or that he changed Jefferson's phrase "We hold these truths to be sacred and undeniable"? If you want to be impressed, try to picture his appointment as an envoy to France. It was late 1776, and his Atlantic crossing would probably take six weeks. He was 71 and in poor health. He chose as traveling companions two grandsons, one 17, the other 7. Would you?

The second article is particularly suited to the interests of modern scientists. The author, Neal Lane, former director of the National Science Foundation, has asked "What would Franklin say?" And he has made a list. It includes:

- ✓ Encourage scientists to run for Congress.
- ✓ Organize science seminars for policy makers.
- ✓ Make better educational use of television and computer games.
- ✓ Work to increase science literacy.

At the time of the revolution, Franklin warned us "They that can give up essential liberty to obtain a little temporary safety deserve neither liberty nor safety". We best remember that today and tomorrow. Read more Franklin. It's heady stuff.

Glenn Schmieg



## Society News

### ESA Officers

President: William Vosteen, Monroe Electronics  
Vice President: Kelly Robinson, Eastman Kodak  
Executive Council: Sheryl Barringer, Ohio State Univ.  
John Gagliardi, Rutgers Univ.  
Mark Zaretsky, Eastman Kodak

### Email Addresses Requested

We would like to include member's current email addresses in our updated roster. Please send your current email address to me at [mark.zaretsky@kodak.com](mailto:mark.zaretsky@kodak.com). Also, please indicate if you would like to receive electronic notification of the newsletter (found on our website <http://www.electrostatics.org>) rather than a hard copy in the mail. Thank you for taking the time to send this information.

## Electrostatic Profiles

LOOKING FOR A FEW MORE BRAVE SOULS: I have been trying to promote this feature for several issues but haven't received many profiles in response. Please take advantage of this opportunity to introduce yourself to the rest of the ESA members and help keep the friendliness growing. Please send your profile to me at [mark.zaretsky@kodak.com](mailto:mark.zaretsky@kodak.com).

Electrostatics  
Society of America



30 Shalimar Drive  
Rochester, NY 14618

## ESA Information

ESA Home Page: <http://www.electrostatics.org>

Bill Vosteen  
President  
Monroe Electronics, Inc.  
100 Housel Ave.  
Lyndonville, NY 14098  
585-765-2254  
[billv@monroe-electronics.com](mailto:billv@monroe-electronics.com)

Steve Cooper  
Secretary/Treasurer  
540 Morton Rd.  
Athens, GA 30605  
706-769-0025  
[essinc@negia.net](mailto:essinc@negia.net)

Mark Zaretsky  
Newsletter Editor  
30 Shalimar Drive  
Rochester, NY 14618  
585-588-6351  
[mark.zaretsky@kodak.com](mailto:mark.zaretsky@kodak.com)