

THE WAVE



The newsletter publication of the International Microwave Power Institute

March/April 2014



New IMPI.org and JMPEE.org Websites Launched

Over the past few weeks, we have launched our new IMPI.org and JMPEE.org websites. The new sites are professionally designed, more user friendly and contain password protected content. The IMPI.org site has easy access to the IMPI Blog and other social media applications, as well as a Members Only section which contains an archive of The Wave newsletters, Membership Directory and Job Postings section. The JMPEE.org site now has password protection on all the recent Volumes of JMPEE; IMPI members have full access to all JMPEE content as part of their membership benefits. Both sites are built in Wordpress, contain Search Engine Optimization and are compliant with mobile devices.

As of today, only 20% of the IMPI membership has registered for the new sites. You need to register for both sites to have full access to the content; please note, this does not replace your previous log in (that you use to renew memberships, purchase Symposium registrations, etc). That log in will always remain the same. Registering with these news sites will simply give you access to the protected content on each of the sites. Please follow these simple steps to get registered today:

- 1) Go to www.impi.org (you may need to hit the refresh button if this is the first time you are visiting the new site)
- 2) In the top right hand corner, click on the Register link, and enter the required information (select a username, password, email, etc)
- 3) Allow one business day for the IMPI Office to confirm your membership is active (i.e dues are paid) and then you will be able to use the Log In link (top right hand corner of the webpage) to access the Member Only section of the website.
- 4) Go to www.jmpee.org (you may need to hit the refresh button if this is the first time you are visiting the new site)
- 5) In the top right hand corner, click on the Register link, and enter the required information (select a username, password, email, etc)
- 6) Allow one business day for the IMPI Office to confirm your membership is active (i.e dues are paid) and you will and then you will be able to use the Log In link (top right hand corner of the homepage) to view the full JMPEE papers.

Letter from the President

by Bob Schiffmann

When I was just starting out as a graduate student at Purdue University (back in the days when slide rules were the norm and pocket calculators were completely unknown) and preparing to register for classes, some of the "old-timer" graduate students gave me a piece of advice: you'll have to choose one of two mandatory classes: either Chemical Literature or Glassblowing. The difference, they said, was that if I chose Chemical Literature I'd probably spend 4 to 6 hours a week in the library plus two lectures; on the other hand, with Glassblowing I could count on spending 5 to 7 evenings a week in the laboratory, every week! Is it any wonder that I chose Chemical Literature?

The Chemical Literature course consisted of a professor lecturing us about the various sources of Chemical Literature and then assigning us problems, to solve in the library, on the order of "Find the chemical procedure required to synthesize compound X". I'd then dutifully trudge off to the University library and spend my time looking through various texts such as "Beilstein's Handbook of Organic Chemistry" (founded in 1881 and still available today as the database Reaxys™).
Continued on Page 2

Meet the Member: Raymond Boxman



Editors Note: Professor Ray Boxman is the incumbent of the Kranzberg Chair of Plasma Engineering at Tel Aviv University. He has served as Coordinator for the Materials Engineering Program, Head of the Department of Interdisciplinary Studies, and Vice Dean for Research in the Faculty of Engineering. Boxman has his Ph.D. from MIT; he has presented over 440 scientific papers at conferences or in technical journals, and he is the holder of ten patents. Boxman is the Technical Program Chair of the 48th Annual Microwave Power Symposium.

I heard about IMPI from Prof. Eli Jerby (former Editor of JMPEE). Eli did his M.Sc. thesis under my supervision many years ago on vacuum arcs (my specialty), but he continued his career in another direction, namely microwave devices. More interesting perhaps, is how did I come to microwaves?

Despite my research specialty in d.c. vacuum arc plasma, I actually have a long interest in RF. As a teenager I was a "ham" radio operator, and acquired also a commercial 1st class radiotelephone license, with an endorsement which permitted me to service shipboard radar. Well to this day I have never seen the insides of a ship's radar, but I used this license to get a summer job while in high school as a broadcast engineer at radio station WIP in Philadelphia. The interest in radio communications steered me towards EE studies at university, but very quickly I became fascinated with plasma. On a co-op assignment at GE in Philadelphia I became involved with the plasma created in a vacuum arc, which became my career specialty. While for GE the coating created by the condensation of metal vapor from the arc plasma on the inside of the insulator separating high power switch electrodes was a problem, I began researching using this phenomena to purposely create coatings and thin films. I kept my hands a little in RF, serving as a signals officer in the U.S. Army and later in the Israel Defense Forces, and teaching from time to time the undergraduate courses on Electromagnetic Fields and Electromagnetic Wave Propagation.

Letter from The President *cont.*

This was an enormous text in which one could find the synthesis of any organic compound known at that time. This was not the only text that I would search, but it taught me the value and necessity of searching the literature before, during and sometimes after any project. It is also essential when one is writing a patent application, since it is necessary to examine and list the prior art.

And yet, I'm constantly surprised how often researchers neglect to do this, but instead turned to the Web and look to see what Wikipedia has to say, and maybe look at references in the first 2 or 3 pages Google finds. Very often they neglect to look at the patent literature. All this came home to me a few years ago when attending a conference at Cambridge University in which a UK government researcher announced work they had done now being offered for license to interested companies. I raised my hand and asked the researcher if he'd bothered looking at the patents in this area because I had four of them that his technology would be infringing upon. Obviously he hadn't and was consequently embarrassed.

As scientists, it is important not only to keep up with the latest research and literature, but also to look back at what has been done before. Many times, there has been important research done that simply fell through the cracks, or was so far ahead of its time that no one paid attention to it. A great example of this is the whole area of plate tectonics, originally modeled in the early 20th century; it wasn't adopted until decades later. It is rare for something totally new to be conceived of or developed, most often it is something that is an extension of what was there before, and that means we have to review "what was there before". One of the several hats that I wear is as an expert witness, and it is essential that I search the literature for every case in which I am involved, sometimes to the annoyance of the attorneys who hire me. But I always make it clear to them, and usually they understand, that we have to find out what happened in the past. But a recent Canadian study (2013) found that approximately 80% of scientific information is lost within about 2 decades. That only makes the challenge of finding what we need even harder.

In this issue's "Ask the Expert" I use some of this literature-searching in order to answer a question posed by a student. I had very limited time, so I only looked at perhaps 15 references, but all seemed to give the same general information, so I stopped searching. However, had this been a project in which I had more time for the task, I would've done a more thorough search of the literature.

In closing, I thought you might enjoy or maybe be shocked by this little factoid that I heard on NPR the other morning: approximately 26% of the American public did not know that the earth goes around the sun; the number is even higher in Europe.

Hope to see you all IMPI 48 in New Orleans, June 18-20, where we can all keep up with the latest information.

Best wishes,

Bob





IMPI 48 Update



Registration is now open for the 48th Annual Microwave Power Symposium (IMPI 48) which will be held at the Doubletree Hotel, June 18-20, 2014 in downtown New Orleans, Louisiana, USA. We have an outstanding program consisting of: two short courses, two keynote presentations, 11 invited speakers, 2 full days of oral and poster technical presentations as well as a Food Science & Technology Program. There will be various networking opportunities including a Welcome Reception and a Group Dinner in the French Quarter. New this year, IMPI 48 will offer a full Spouse/Guest Program. IMPI 48 will take place just prior to the Annual IFT conference also taking place in New Orleans.

IMPI Members can register for the Symposium at a reduced rate; save even more when you register before the April 15th Early Bird deadline. Visit www.impi.org for the latest program, registration details, and hotel room information.

Ask the Expert

by Bob Schiffmann

Recently, in the middle of my breakfast, I received a frantic call from a high school student who was about to take a test and wanted to know if you can “microwave isopropyl alcohol?” I explained that what he was asking was probably not the question the teacher asked since one can microwave anything, for example your shoes. What is more likely is that the teacher is asking, “ Will isopropyl alcohol heat well (or get hot) in a microwave oven?” I explained that I'm the middle of my breakfast and don't have access to my texts regarding the microwave (dielectric) properties of isopropyl alcohol, but what I do know about its chemistry suggests that it probably would heat well; I suggested that he call me back in an hour and I'll see what I can find and give him a more definitive answer. Well, he never called back, but out of curiosity I decided to see what I could find.

My first approach was to search a few textbooks in my library, and in Von Hippel's book “Dielectric Materials and Applications” (MIT Press, 1954) I found the dielectric properties for n-Propyl Alcohol (1-Propanol, n-Propyl Alcohol) which is an isomer of Isopropyl Alcohol (2-Propanol):

Liquid		ϵ'	$\tan\delta$	ϵ'' ***
n-Propyl Alcohol (25°C)	*	3.7	0.67	2.5
“	(25°C)**	16.0	0.42	6.7
Water (25 C)		76.7	0.157	12.0

Continued on Page 4

Calendar of Events

IMPI Webinar: Basics of Microwave Heating, April 2, 2014 from 11am-12pm EST. No charge for IMPI Members. More details to follow. www.impi.org

48th Annual Microwave Power Symposium (IMPI 48), June 18-20, 2014 at the Doubletree Hotel, Downtown New Orleans, Louisiana, USA. www.impi.org

IFT 14, Annual Food Meeting and Expo, June 21-24, 2014 at the New Orleans Morial Convention Center, New Orleans, Louisiana, USA www.ift.org

Ask the Expert Continued

At this point I turned to Google and found quite a bit of data on the dielectric constant of Isopropyl Alcohol:

Liquid	(ϵ')	Temp ($^{\circ}$ C)	Source
Isopropyl Alcohol	19.92	?	(1)
Propyl Alcohol	21.8	20	(2)
2-Propanol	19.26	25	(3)
Isopropyl Alcohol	18.6	20	(4)
Isopropyl Alcohol	17.9	?	(5)
Isopropyl Alcohol 99	18.6	20	(6)

Sources: (1) Louisiana State U; (2) Engineer's Toolbox; (3) Dortmund Data Bank; (4) Monument Chemical data sheet; (5) Washington State U; (6) Panachem data sheet.

Interestingly, I didn't come across any data on loss factor or loss tangent, although I might have had I continued my search, since it resulted in over 1.3 million hits. However, extrapolating from what I did find I'd say that Isopropyl Alcohol should heat rather well in a microwave oven. The next step would be to run a test, however, in my lab I only have 91% isopropyl rubbing alcohol, which contains water, so any results I obtained might not relate to pure Isopropyl Alcohol. It will have to wait for another time.

Do you have a question, or answer, to share? Email molly.poisant@impi.org

Meet the Member Continued

One type of thin films which we researched was transparent conducting oxide films. At some point my University hosted a representative from one of the large Korean conglomerates who was technology shopping. And I asked naively, what about using a TCO coating to replace the metal grids in microwave oven windows? This started a line of research which culminated in a window affording really great visibility of the contents of the microwave oven during cooking, while blocking microwave leakage even better than the conventional metal grid window. I approached Eli Jerby for help on this project, and he seconded to me Dr. Vladimir Dhiktyar, who subsequently initiated several projects in the lab involving microwave excited lamps. When we started getting interesting results, I asked Prof. Jerby at which forum would it be appropriate to report on our results, and make industrial contacts, and he steered me to IMPI.

My goal in being an IMPI member was primarily to make industrial contacts which might help in the eventual commercialization of the oven window and microwave excited lamps, as well as keeping up with what is happening in these fields. My involvement in IMPI exposed me to a wide range of applications which I didn't even dream existed, as well as meeting very interesting and pleasant colleagues.

As Technical Program Committee Chairman for IMPI-48, my goal is together with the Committee to put together a technical program that will interest all of us, and keep us up to date, and even more important, provide the framework for valuable and informative informal networking among our colleagues.

Regards,
Ray

[DoE Issues Regulation on Standby Power of Microwave Ovens](#) by Dr. John Osepchuk

INTERACTIVE IMPI [Direct links to Microwave News on the Web](#)

Baby Boomer Alert: [Happy Birthday](#) to the Microwave Oven!

ExOne announces 2 acquisitions [totaling nearly \\$10M](#)

The Goldhaber's Warning Report (February 2014) recognized the IMPI 47 Symposium as a catalyst for a new FDA Study. The study will examine whether proposed label changes should include a change from "grams" of added sugar in certain products to "teaspoons" of sugar, in order to better communicate with the public.

Gerry Goldhaber and FSIS's Dr. William Shaw were both speakers at the IMPI 47 Symposium. [Click here to subscribe](#) to the Goldhaber's Warning Report.



Follow us [on FACEBOOK!](#)



Follow us [on TWITTER!](#)



Visit [IMPI's Blog!](#)

INTERNATIONAL MICROWAVE POWER INSTITUTE

PO BOX 1140
MECHANICSVILLE, VA
23111
USA

Ph: + 1 804-559-6667

Email: info@impi.org

www.impi.org