

IEEE RRVS SECTION September 2005 Dinner Meeting

22 September, 2005

Featuring Dr. Paul J. A. Kenis, Assistant Professor in the Department of Chemical & Biologic al Engineering at the University of Illinois at Urbana-Champaign who spoke on “Fuel Cells and Fuel Reformers for Portable and Non-Portable Power Sources”

Review by Ron Hendrickson

Our dinner meeting tonight, the 22nd of September, was at the Woodward Technology Center. At this event 29 people enjoyed the dinner buffet of: boneless backed chicken breast, vegetarian lasagna, backed potatoes, mixed vegetables, and a mini cream puff for desert. One person was on the attendance list, but chose not to dine. Out of the 29 attendees, 10 students from NIU made the trip from Dekalb, to enjoy/learn from the presentation delivered by Dr. Paul Kenis. Right after his talk began a couple additional students arrived along with about 12 people from Professor Joe Etimans class.



Dr. Paul J. A. Kenis

Announcements were made about future RRVS meetings; the last week in October we are going to listen to someone from Motorola talking about circuits that actually operates on paper, no it's not schematics, this interests me, and this needs further investigation on my part. On Nov. 15 an individual from IEEE is going to speak on control systems at NIU. So mark your calendars.

Dr. Kenis started his presentation talking about **the George Bush hydrogen economy**. But wait...how do fuel cells fit in? At this point Dr. Kenis pulled out some statistics: Out of 1 gallon of fuel, it produces 5lbs of CO₂ (think of fossil fuels). This also generates greenhouse gas. The US need 78.6 million barrels (remember 1 barrel=58.**? gal). 9 countries create a 90% percent rating for the oil that's imported to the US. Then, if there is a problem you still have the Strategic Petroleum Reserve (SPR) which can be tapped into for disasters (like Katrina, and maybe even Rita). The rigs out of Houston deliver 30% of US production. Think of all the green house gas that's being produced. How can we limit the greenhouse gas effect, and more important the fate of the declining oil supply?

The answer is hydrogen: $H_2 + O_2 \longrightarrow H_2O$. He showed a slide with Kermit the frog stating that “It's not easy being green”. You can produce all the hydrogen, which is pollution free, by electrolysis of water. Another slide was shown that for electric power; coal was used for 68% (the US has a lot of coal), nuclear 20%, hydroelectric 7%, and the rest (5%) was others.

The sources electric energy comes from are wind, solar, hydroelectric (big dam in China), and nuclear. If we are looking at hydrogen we need to store this “tank”. In the future there will be hydrogen stations instead of gas stations and you will trade your empty hydrogen container for a “tank of full supply. Just like a gas grill!

Everyone wants portable power. You need this for cell phones, PDA's and laptop computers. This fuel cell has a higher energy density property, which has the scale to produce output of MW to μ W. **I'm running out of writing space!**

Basically you have a fuel cell & a small rechargeable battery in-which the fuel cell will recharge. Dr. Kenis gave an example where some soldiers in Iraq were getting killed because they were running logistics of batteries from Kuwait to the front lines. As a retired Signal Officer (communications) from the US Army, I personally know the struggles of logistics for **heavy** batteries. I'll close talking about hydrogen. He stated that some Special Forces teams are using Fuel Cells in Afghanistan and Iraq. The Fuel Cells are outperforming their traditional means of using acid batteries. (Alkaline is about 50-60% more efficient than acid).

For hydrogen research \$2 billion/over five years has been set aside for further studies, and \$1.3 billion/over 5 years has been earmarked for development. Estimated cost to initiate a hydrogen economy is \$1 trillion/over 10 years. In respect to Iraq and the price of homeland security, this number is very reasonable. Bigger picture, look at the conflicts the people from Houston have to evacuate their homes to escape Rita, they haven't even addressed the potential 30% of petroleum loss from Houston.

RRVS would like to **thank Dr. Kenis** for his presentation on “Fuel Cells and Fuel Reformers for Portable and Non-Portable Power Sources”. This one page summary only covers a small portion of his presentation, but issues that should be at least documented for further study.

Again, RRVS appreciates your work and presentation.

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