Plastic shopping bags make a fine diesel fuel

By Diana Yates
Life Sciences Editor

Plastic shopping bags, an abundant source of litter on land and at sea, can be converted into diesel, natural gas and other useful petroleum products, researchers report.

The conversion produces significantly more energy than it requires and results in transportation fuels – diesel, for example – that can be blended with existing ultra-low-sulfur diesels and biodiesels. Other products, such as natural gas, naphtha (a solvent), gasoline, waxes and lubricating oils such as engine oil and hydraulic oil also can be obtained from shopping bags.

A report of the new study appears in the journal Fuel Processing Technology.

There are other advantages to the approach, which involves heating the bags in an oxygen-free chamber, a process called pyrolysis, said Brajendra Kumar Sharma, a senior research scientist at the Illinois Sustainable Technology Center who led the research. The ISTC is a division of the Prairie Research Institute at the U. of I.

“You can get only 50 to 55 percent fuel from the distillation of petroleum crude oil,” Sharma said. “But since this plastic is made from petroleum in the first place, we can recover almost 80 percent fuel from it through distillation.”

Americans throw away about 100 billion plastic shopping bags each year, according to the Worldwatch Institute. The U.S. Environmental Protection Agency reports that only about 13 percent are recycled. The rest of the bags end up in landfills or escape to the wild, blowing across the landscape and entering waterways.

Plastic bags make up a sizeable portion of the plastic debris in giant ocean garbage patches that are killing wildlife and littering beaches. Plastic bags “have been detected as far north and south as the poles,” the researchers wrote.

“Over a period of time, this material starts breaking into tiny pieces, and is ingested along with plankton by aquatic animals,” Sharma said. Fish, birds, ocean mammals and other creatures have been found with a lot of plastic particles in their guts.

While shopping bags also threaten wildlife, Sharma said.

“Turtles, for example, think that the plastic grocery bags are jellyfish and they try to eat them,” he said. Other creatures become entangled in the bags.

Previous studies have used pyrolysis to set FUEL, Print 11

Reuse
Used plastic shopping bags can be converted into petroleum products that serve a multitude of purposes.
Communication seeks to recognize ‘specialized faculty’

By Mike Helenthal
Assistant Editor

The University is entering a new term that doesn’t define (non-tenured) faculty by what they are not.

“We will continue to meet,” she said, asking anyone with concerns to contact her with suggestions. “We want to embrace your ideas.”

The discussion continued in the context of a broader term that is no longer being used to describe faculty. The question of what to call non-tenured faculty members is one that the University has been considering for some time. The University’s Communications Office has been working on a plan to address this issue and to ensure that the language used to describe faculty members is clear and accurate.

The discussion also touched on the need for a term that is more inclusive and reflects the diversity of faculty members. The University is committed to creating a more equitable and inclusive environment for all faculty members, and this includes recognizing the contributions of non-tenured faculty.

The University is currently working on a plan to address this issue and to ensure that the language used to describe faculty members is clear and accurate. The plan includes conducting a survey of faculty members to gather their input and to determine what language they prefer.

In the meantime, the Communications Office is encouraging faculty members to use a variety of terms to describe non-tenured faculty, including the term “adjunct” or “lecturer.” These terms are being used by many universities and are widely understood.

The University is committed to creating a more equitable and inclusive environment for all faculty members, and this includes recognizing the contributions of non-tenured faculty. The Communications Office is working to ensure that the language used to describe faculty members is clear and accurate, and that faculty members are recognized for their contributions to the University and to the field.

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**Illinois professor was one of the ‘Monuments Men’**

By Dusty Rhodes

Arts and Humanities Editor

In the movie “The Monuments Men,” a WWII drama based on the true story of a platoon of art historians recruited to rescue masterpieces stolen by the Nazis in World War II, one of the heroes was Edwin Carter Rae, who taught art history at the U. of I. Both before and after his service with the U.S. Army.

In 2014, the University of Illinois at Urbana-Champaign donated a variety of untitled photographs taken during Illinois professor Edwin Carter Rae’s service as one of the “Monuments Men,” as well as Rae’s diary from that time, are available in the Edwin C. Rae Papers in the University Archives.

**“Gothic Architecture in Ireland.”** He joined the military in 1942, and was transferred to the MFAA in Germany following the Allied victory, according to the Monuments Men Foundation website. He attained the rank of captain, and France awarded him his Legion of Honor.

The MFAA was a group of about 350 men and women, colloquially known as “Monuments Men,” charged with protecting and preserving cultural treasures. In the years after the war, they returned more than 5 million artistic items stolen by the Nazis and helped rebuild cultural life in Europe by organizing art exhibitions and concerts. Rae, stationed in Bavaria, organized one of the first post-war exhibitions in Germany, showcasing many German Renaissance paintings. He returned to the university in 1947, resumed teaching and was chairman of the art history department from 1954 to 1971. He retired in 1979 and died in 2002.

**Historical papers.** A variety of untitled photographs taken during Illinois professor Edwin Carter Rae’s service as one of the “Monuments Men,” as well as Rae’s diary from that time, are available in the Edwin C. Rae Papers in the University Archives.
Faculty leaders discuss shared governance, possible effects of faculty union

Editor’s note: The discussion about establishing a faculty union on the Urbana campus has accelerated in recent months amid efforts by the Campus Faculty Association to identify and sign up supporters. Nieso Bureau news editor Mike Hilerth submitted the same questions to CFA leaders and two critics of a faculty union, asking them to discuss shared governance and the pros and cons of establishing a faculty union at Urbana.

1. What has been the general campus reaction to the recent signature drive to form a union and what concerns have you heard?

The Campus Faculty Association is currently assessing interest in unionization among tenure-stream and non-tenure-stream faculty members, aiming to establish a separate bargaining unit for each group. Colleagues all around campus have weighed in on their positions and shared their experiences. We are passionate about our teaching, our students and our research – yet many faculty members express concerns about losing collegiality, pensions, job security and shared governance. In addition, as well as increasing class sizes, gender equity and diversity, hundreds of colleagues have felt inspired to sign the CFA’s motion statement, a part of which reads: “We respect the values of a merit-based, research-oriented university and our other core mission of preparing tomorrow’s leaders and to serve the people of the state, the nation and the world.”

Our recent publications “We Support the Faculty Union” presents a selection of statements from those in favor of forming a union, from faculty of all ranks and disciplines. As representatives of our signers put it, a faculty union is about the potential of our faculty to preserve the high-quality education that we provide for everyone involved in the life of this university.

2. Are the recent changes in the state’s public-employee pension law a good or bad thing for you?

For more information on the Campus Faculty Association and efforts to unionize on campus:

www.champaignbureau.com/CampusFacultyAssociation

For more information, email campusfacultyassoc@gmail.com

3. Can the Urbana Academic Senate and a union organization co-exist?

The recent passing of legislation that would allow for the formation of a faculty union. Our unionized faculty colleagues at UIC are faculty members. The university administration would not be able to take collective action and would instead influence promotion and tenure decisions or any other questions of academic judgment. A union contract, bargained and voted on by the local membership, would give faculty members a strong voice on employment-related policy.

4. How committed do you think campus administration and the U of I Board of Trustees are to shared governance?

The issue is for us whether shared governance works within its primary sphere of influence over educational policy, but whether the faculty possess a mechanism to exercise authority over other aspects of their working lives. That is where we see the need for a faculty union.

5. Was the demise of the Michael Hogan presidency due to a lack of background and rank, and unity?

6. What can shared governance provide faculty recruitment and hiring?

7. The faculty union at the Chicago campus announced its intention to strike should negotiations fail: how does this experience within the Illinois family inform the current unionization debate on the Urbana campus?

8. How would having a union affect faculty recruitment and hiring?

9. How would a faculty union affect collective bargaining?

10. What has been the general campus reaction to the recent signature drive to form a union and what concerns have you heard?

3. Can the Urbana Academic Senate and a union organization co-exist? Universities can form a separate bargaining unit for each group.

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Editor’s Note: At press time, many UIC faculty members were taking part in the recent two-day strike and informational picket that led to the cancellation of nearly half of UIC’s classes.

The Chicago Daily Herald

www.sunshinetimes.com/3PhysResExcellence

For information on faculty members speaking against a faculty union:

preservingscienceblogspot.com

preservingscienceblogspot.com/2014/01/occasionally-asked-questions.html

Feb. 20, 2014

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Perceived job insecurity results in lower use of work programs

By Phil Ciccarelli

From a campus survey the hungers of work life for faculty and students don’t line up, the specter of job insecurity for college students is constant and real. But even just the perception of job insecurity can present notable problems for organizations and employees, says research co-writer U of I’s expert in organizational behavior and human resources management. “Feelings of job insecurity can be harmful to employees well-being and, moreover, they may also prevent employees from using workplace programs aimed at improving their well-being,” says The Brad Blatts, a professor of labor and employment relations at Illinois. “It’s a vicious cycle that merits more attention.”

According to Harris, efforts to increase the acceptance and use of organizational support programs and establish a clear and healthy workplace culture may be skewed from the start by the impressions that doing so could further undermine job security.

The research, co-written by Wendy R. Boswell, of Texas A&M and John B. Bloom-Buckman, of California State University, Fresno, examined women’s perceptions of job insecurity and use of workplace support programs. It also studied work and nonwork boundaries and work-home transitions, the mediators of these responses on work-life conflict and emotional exhaustion.

Work demands (that) to increase the use of workplace support programs for employees who are already under the impression that doing so underlines job insecurity, says research co-writer E. Bradford Harris, a professor of labor and employment relations at Illinois.

Workplace programs aimed at increasing the acceptance and use of support programs are actually on the right path; they just have more work to do. They cannot start by assuming employees that it is safe to use these programs. Practically speaking, this might be as simple as doing a better job of communicating through official corporate channels.

However, Harris suspects that some managers and supervisors need to be coached a bit more. Even if a corporation has the best intentions, employees will likely hear their supervisors’ reactions when deciding on what behaviors are most acceptable, and that those managers and supervisors need to be coached. “If they fear their supervisors’ opinions might be negatively skewed by the use of a particular support program, they will probably refrain from using it.”

But how can organizations handle employees and supervisors who do not buy into the benefits of support programs? According to Harris that can be as simple as articulating the potentially high costs associated with perceptions of job insecurity and, by extension, workplace stress.

“Organizations risk declines in employee performance overall the long run, greater turnover and, more important, organizational capital,” he said. “So being able to articulate these consequences can help validate workplace balance programs as valuable programs, not just ‘warm and fuzzy’ HR-speak. In monetary terms, it’s a simple return on investment is: If the employees who need the support programs are afraid to use them, you’re unnecessarily limiting the upside of your investment.”

Likewise, employees need to know “where-to-turn-when” about working too much. Harris said. They also need to be able to use less work-related stress where it belongs – at work, where it belongs.

“If they can’t, they should utilize the in-house corporate programs to help them learn how to manage their work-life boundaries,” he said. “Now, that’s easier said than done. I still find myself checking my smartphone at night, developing lesson plans for class instead of eating dinner with my family, and doing countless other work activities while at home. A lot of this is driven by the enjoyment I derive from my job, but some of it is also driven by my own insecurity fears surrounding the ‘right path; they just have more work to do. They cannot start by assuming employees that it is safe to use these programs. Practically speaking, this might be as simple as doing a better job of communicating through official corporate channels.

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The project, with 50 to 50 vehi-
cles traveling together, gathered data around tornados as well as around thunderstorms that did not produce tornadoes. “We were trying to under-
standing why some produce torna-
does and some don’t,” he said.

At the U of I, this leads to an in-
crease in thunderstorms, lightning, flash floods, high winds, hail, tornadomes and severe weather. “These are the answer questions from the audience. The U. of L. clinical professor co-authored two groups of atmospheric sci-
ences students out the field each spring to observe severe weather. They’re careful to stay in a safe spot to watch. He and a group of students were nearly last spring when three storm chasers died due to a tornado in Oklahoma. “We saw the tornado from the back where we were safe,” he said. “We were behind it and not in the way of it.”

Farris chases tornados to gather valuable scientific data with the Dop-
er on Whales tails, most recently as a part of VORTEX in 2000 and 2009. “I was the lead navigator.” He’s a relationship-oriented, bottom mobile Doppler radar track, fore-
casting storms and making sure we were safe,” he said.

Every day the group sketched and forecasted the weather, looking for ways within driving distance where storms might develop. “Stu-
dents tell me they learn more in those two weeks than they’ve learned in any other two-week period in their lives,” he said.

Illinois Public Media is working with the Beckman Institute for Ad-
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tribution of atmospheric sciences for the event.”

Inside illinois

On the web

illinois.edu

Photo courtesy Jeffrey Frame

BRIEFS

BRIEFS

Additional materials on the 2009 Illinois Meadow Brook Memorial Lecture on Elder Law can be found at Illinois Public Media’s free Community Cinema screen-
ing of “Ali: A Different Frame,” begins at 7 p.m. at the Beck-
man Institute auditorium, Urbana.

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Inside Illinios
Insect Fear Film Festival: Pesticides take center stage

By Dusty Rhodes
Arts and Humanities Editor

Feb. 20, 2014

The 2013 photograph was taken during the university’s move from Tallaght to the new building on the main campus. The university continued to grow during the 20th century, and the campus grew with it. The University Library currently contains 1.3 million volumes and continues to grow.

ON THE WEB
illinois.edu/UFF_14

An optional meeting for prospective parents was can-
celled earlier this month because of bad weather and
will be held from 7-8:15 p.m. Feb. 26 in Room 75 of the
Children’s Research Center.

The school is a founding member of the fourth-grade class at the College of Education’s lab school beginning academic
year 2014-15 at the Children’s Research Center building on
campus. The school engages children in creative, challeng-
ing artistic, math, science, and social studies projects.

Children’s Research Center. For more information, visit the school website or email Bart Bartels at bbartel@illinois.edu.

http://icap.sustainability.illinois.edu/project/recyclemania

The paper will appear in the journal Person-

Nestle’s of the Beckman Institute for Advanced Science and Technology, or email Barr Barcel at bbartel@illinois.edu.

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Beckman Institute Director’s Seminar

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Techniques yield new insights into ribosome self-assembly

By Diana Yates

Life Sciences Editor

Ribosomes, the cellular machines that build proteins, are themselves made up of dozens of proteins and a few looping strands of RNA. A new study, reported in the journal Nature, offers new clues about how the ribosome, the master assembler of proteins, also assembles itself.

“The ribosome has more than 50 different parts—it has the complexity of a sewing machine in terms of the number of parts,” said U. of I. physics professor Taekjip Ha, who led the research with U. of I. chemistry professor Zaida Luthey-Schulten and Johns Hopkins University biophysics professor Sarah Woodson. “A sewing machine assembles other things but it cannot assemble itself if you have the parts lying around,” said Ha. “The ribosome, however, can do that. It’s quite amazing.”

In 2000, scientists published precise atomic structures of intact ribosomes (a feat that won them a 2009 Nobel Prize in chemistry) and for decades researchers have delved into the mechanics of ribosome function. But scientists have much to learn about how the ribosome itself is built from its component parts, Luthey-Schulten said.

Solving the atomic structure was a huge step forward “that tells us what the ribosome looks like once it’s assembled,” she said. “But it doesn’t tell you anything about how it gets there, how all these parts come together.”

All ribosomes consist of two subunits, each a cluster of precisely folded proteins and RNA. The team focused on the small ribosomal RNA (known as 16S).

The researchers labeled one of those ribosomal proteins. Known as S4, it is thought to be the first to interact with the 16S RNA during assembly. They also labeled two sites on the 16S RNA. Each label fluoresced a different color, and was designed to glow more brightly when in close proximity to another label (a technology known as FRET). These signals offered clues about how the RNA and proteins were interacting.

The team was most interested in a central region of the 16S RNA because it contains signature sequences that differentiate the three cellular “domains,” or superkingdoms, of life. Previous studies suggested that this region also was key to the RNA-protein interactions that occur in the earliest stages of ribosome assembly.

Using a “computational microscope,” the team compared data from their FRET experiments with an all-atom simulation of the protein and RNA interaction. Their analysis revealed that the S4 protein and the 16S ribosomal RNA were a surprisingly “dynamic duo,” Ha said. The protein constrained the RNA somewhat, but still allowed it to undulate and change its conformation.

The team found that the S4 protein tends to bind to the RNA when the RNA takes on an unusual conformation—one not seen in the fully assembled ribosome. This was a surprise, since scientists generally assume that ribosomal proteins lock RNA into its final, three-dimensional shape.

“We found that the S4 and RNA complex is not static,” Ha said. “It actually is dynamic and that dynamism is likely to allow binding of the next protein” in the sequence of ribosome assembly.

“Once the S4 binds, it induces other conformational changes that allow the binding sites for other proteins to appear,” he said. “So the binding site for the third protein doesn’t appear until after the second protein is there.”

This intricate dance of molecules leading to the assembly of ribosomes occurs very fast, Luthey-Schulten said.

“You can go from as few as 1,000 to 30,000 ribosomes in a bacterial cell during its cell cycle,” she said. “More than 80 percent of the RNA that’s in the cell is in the ribosomes.”

Knowing how the ribosome is put together offers new antibiotic targets, said Ha, who is a Howard Hughes Medical Institute investigator and a co-director of the Center for the Physics of Living Cells at Illinois.

“Instead of waiting until your enemy has fully assembled its army, you want to intervene early to prevent that from happening,” he said. “We know that this protein/RNA region has unique signatures in bacteria, so maybe we can target this process while keeping the human ribosome intact.”

Luthey-Schulten and Ha are affiliates of the Institute for Genomic Biology and the Beckman Institute at the U. of I.

The National Science Foundation and HHMI funded this project.

To view job postings, apply for civil service or academic jobs at Illinois, or to update your application information:

@Illinois jobs.illinois.edu