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Wednesday, May 18, 2011

Crowne Plaza Hotel, Somerset, New Jersey

Joseph A. Kocal
2011 Excellence in Catalysis Award Team
UOP LLC, A Honeywell Company

“Renewable Feedstocks to Green Fuels”

Global energy demand is expected to grow at CAGR 1.6% through 2015¹. Energy diversity will become increasingly important with coal, natural gas and renewable feedstocks playing more important roles. Over this period, biofuels are expected to grow at 8-12% per year to 2 million barrels per day. Second generation feedstocks that do not compete with food supplies, land and water usage, or cause other environmental problems must be developed. Examples of such feedstocks are cellulosics and algal oils.

UOP in collaboration with ENI have developed EcofiningTM technology that produces green diesel from natural oils and greases. The product from this process is completely deoxygenated, has a cetane number range from 75-90 (vs. 40-55 for petrodiesel), and excellent cold flow properties. The green diesel can be added in any proportion to the existing pool. The high cetane allows blending low cetane refinery streams to expand the total diesel pool.

UOP Green jet technology is built on Ecofining technology and was initially funded by the Defense Advanced Research Projects Agency (DARPA). A novel second stage catalyst that selectively cracks and isomerizes n-paraffins to meet the strict jet fuel energy density, freeze point, flash point, oxidation stability, and boiling range was discovered and developed. The paraffin product from this process meets all properties and will be certified as a 50% blending component in jet fuel in 2011.

The availability of natural oils and greases will be limited in the immediate future until the availability of algal and other oils are developed. Global biomass estimates for forest and agricultural residue is estimated to be 1.9 billion dry tons per year². This biomass would be available for conversion to fuel and/or chemicals. Estimates from laboratory data indicate up to 30% substitution of the global transportation pool could be achieved. Envergent Technologies, a joint venture of UOP and Ensyn are developing technology for the conversion of these residues to fungible fuels. The first stage of the process uses commercially demonstrated thermal pyrolysis of the solid biomass to a liquid bio-oil. Second stage technology is under development to convert the bio-oil to gasoline, diesel, and jet fuels via catalytic deoxygenation. Demonstration runs have produced gasoline product of 88 R&M/2

and a jet component that when blended with the paraffins produced via the aforementioned Green Jet Process yields an on spec jet fuel from completely renewable resources. This technology was initiated under a US DOE CRADA with the National Renewable Energy Laboratory and the Pacific Northwest National Laboratory. UOP expects to complete development of this technology by end of 2012.

LCA studies have been completed for all the technologies that have been discussed. Substantial greenhouse gas emission savings have been demonstrated for all. The studies were conducted to ISO 14040 standards and included all steps from cultivation through fuel production and combustion in transportation use.

References

1. IEA, 2008
2. Oakridge National Labs and USDA

Dinner is a buffet, and includes <u>a choice of beef, chicken or fish</u>		Members	\$37
		Non-members	\$45
Social Hour (Cash Bar)	6:00 PM	Students	\$17 (Student Members = \$5)
Dinner	7:00 PM	Retired/Post-Doc/ Unemp.	\$37 (Members = \$27)
Presentation	7:45 PM	Annual Dues	\$15

Deadline for dinner reservations is 2:00 p.m. Friday, May 13, 2011

Call or email Amanda Josey (973) 245-6173 (amanda.josey@basf.com) for reservations. With the exception of extreme circumstances, anyone not canceling reservations by the above deadline will be billed for dinner regardless of attendance.

2010-2011 Officers: Marco Castaldi (Chair), Changkun Liu (Chair-Elect), Wolfgang Ruettinger (Past Chair), Israel Wachs (Catalysis Society Rep), Amanda Josey (Secretary), John Brody (Treasurer), Jennifer Wade (Webmaster), David Harris, Jeff Yang, John Byrne (Directors)