**Catalysis**

Dr. Rakesh Bajpai’s research involves chemical and biological transformations of natural resources, and industrial and municipal wastes to biofuels and value-added chemicals, such as pharmaceuticals and nutraceuticals. His research team, therefore, investigates kinetics of microbial growth and product formation, transport processes in reactors, strategies of bioreactor operation, and scale-up issues in utilization of biological agents (enzymes, microorganisms). Lately, the focus of his research has been production of microbial lipids from starches and lignocellulosics.

Dr. Mark Zappi (Dean of Engineering) has been recently named the new director of the UL Energy Institute, which is the university’s flagship center for issues pertaining to energy production and usage, and how this industrial activity can be performed within minimal adverse impacts to ecological and social systems (inclusive of energy markets). The EI integrates petroleum resource development with alternative energy production, energy conservation, energy business development, and the study of sociological impacts of the energy industry on Louisiana regions.

The EI working in partnership with Cleco initiated work activities at the new Cleco Alternative Energy Center recently constructed in Crowley, LA on five acres of land owned by UL (located in the industrial park). This new $8M total investment via funds primarily provided by Cleco and the US Department of Energy features industrial quality, large demonstration systems focusing on energy and green chemical production. Example facilities include a 3-ton per day biomass-fed gasification systems, a doubled row 100 feet long solar thermal power unit, and a 0.25 ton per day continuously fed torrefaction test bed. The facility is anchored by a large research facility equipped with a new analytical laboratory, offices, meeting areas, process control area, and a large pilot test area.

Dr. Rafael Hernandez is the Associate Director of the Energy Institute. His research activities are focused on the transformation of wastewater treatment facilities into centers of biocrude for producing biodiesel and renewable diesel. He is interested in developing the scientific and engineering foundations to maximize the production of sustainable feedstock for producing biofuels. His research group has demonstrated that biodiesel can be produced from sewage sludge. Presently, the objective is to improve the chemical and biological processes that occur in wastewater treatment facilities to convert waste carbon and nutrients into sources of oil and develop robust chemical processes to convert the oil into fuels and building blocks for the manufacture of consumer products. He is also working on the depolymerization of biomass using supercritical methanol.  The liquid product generated could be converted by heterogeneous or enzyme catalysis into transportation fuel components, or lipids, respectively.