

Energy Division

No.	Potential Thesis topic	Short description of thesis	Research Lab	Level of degree	Qualification of student	Research project support	special requirement	Remark/Co advisor
<u>Name of Advisor : Asst. Prof. Dr. Nakorn Worasuwanarak</u>								
1	Effects of inorganic matters on pyrolysis of biomass (collaboration with CIRAD, France)		AFPL	PhD and MS	Chemical Engineering / Chemistry	Living expenses 6,000 ฿/m		
2	Upgrading of biomass by torrefaction process (collaboration with CIRAD, France)		AFPL	PhD and MS	Chemical Engineering / Chemistry	Living expenses 6,000 ฿/m		
3	Upgrading of liquid bio-fuel derived from degradative solvent extraction (collaboration with Kyoto University, Japan)		AFPL	PhD and MS	Chemical Engineering / Chemistry	Living expenses 6,000 ฿/m		
4	Production of advanced carbonaceous materials from biomass by degradative solvent extraction (collaboration with Kyoto University, Japan)		AFPL	PhD and MS	Chemical Engineering / Chemistry	Living expenses 6,000 ฿/m		

Name of Advisor : Assoc.Prof.Dr. Navadol Laosiripojana

5	A study of Gas-to-Liquid (GTL) production via catalytic Fischer–Tropsch (FT)-synthesis: Experimental and simulation works	This work relates to the development of low cost Fe-based catalyst for converting natural gas to liquid fuels. The catalyst activity and its intrinsic kinetics will be studied. Then, the kinetics information will be used in the fluid-dynamic simulation to predict the mass-temperature behaviors of the reaction in the micro channel reactor.	AFPL	PhD	Chemical Engineering / Chemistry	PTT (Gas separation plant)		
6	Lignin removal from lignocellulosic biomass via solvent fractionation process	This work relates to the study of solvent fractionation process to remove and purify lignin from several lignocellulosic biomass for later utilizations in petrochemical process. In detail, several types of solvent, acid promoter and operating conditions will be studied to optimize the process condition where the enhanced yield and purity of lignin can be maximized.	AFPL	Master	Chemical Engineering / Chemistry	PTT (Gas separation plant)		

Name of Advisor : Prof. Dr. Surapong Chirarattananon

7	Daylighting through Multiple Slat Shading Devices on Windows that Face Northeast	The main objective of this research is to find appropriate configurations in the use of devices to prevent the entry of radiation from the sun through windows on the northeastern facade, but to allow beneficial penetration of daylight from sky for a balanced daylight gain that reduced overall energy use for lighting and air-conditioning.	BEST	Master	Engineering or Science			
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8	Daylighting through Multiple Slat Shading Devices on Windows that Face Southeast.	The objective and scope of this research are similar to those in Topic 1, but the orientation of the windows and the paths of travel of the sun are different.	BEST	Master	Engineering or Science			
9	A Study of the Relationship between Life Cycle Cost and Energy Performance of Electric Lighting for Commercial Buildings	The main objective of this research is to evaluate the life cycle cost and the energy performance of a given lighting setting that is used according to a generic lighting design for various combinations of light setting options and various generic designs that comply with reference lighting standard for each given type of commercial buildings.	BEST	Master	Engineering or Science			
10	A Study of the Relationship between Life Cycle Cost and Energy Performance of Wall and Roof for Commercial Buildings	The main objective of this research is to evaluate the life cycle cost and the energy performance of a given wall and a given roof configuration that are used according to a generic building design for various combinations of design options for each given type of commercial buildings.	BEST	Master	Engineering or Science			
11	Application of Partially Shaded Concentrator for Rectangular Light Pipes	The main objective of this research is to investigate application of partially shaded light concentrator connected to rectangular light pipes for capturing daylight for illumination of interior spaces of tall buildings. The shading device to be placed above the light concentrator is designed to enhance uniformity of transmitted daylight at the outlet port of light pipe.	BEST	Master	Engineering or Science			

12	Application of Parabolic Reflector for Round Light Pipes	The main objective is to conduct a theoretical and experimental study of transmission of daylight through round light pipes where a tracking parabolic reflector is attached at the entrance to the pipes.	BEST	Master	Engineering or Science			
13	Desiccant Dehumidification with Heat Pump	The main objective of this study is to conduct in-depth investigation of a continuous desiccant dehumidifier that uses hot water generated from a medium temperature heat pump and conduct physical experiments with it. The Cool water from heat pump will also be used to cool the desiccant during adsorption.	BEST	Master	Engineering or Science			
14	Simulation of Dehumidification of Ventilation Air with Cooling Coils	The main objective is to conduct simulation study using TRNSYS program to study the performance of cooling coil and heat recovery coils operated under Thai climate to supply dry and cool ventilation air to air-conditioned spaces that are utilized under 3 commercial functions and 3 residential functions.	BEST	Master	Engineering or Science			
15	Simulation of Dehumidification of Ventilation Air with Enthalpy wheel and Cooling Coils - Case1	The main objective is to conduct simulation study using TRNSYS program to study the performance of 3 system configurations that use enthalpy wheel, cooling coil and heat recovery coils operated under Thai climate to supply dry and cool ventilation air to air-conditioned spaces that are utilized under 3 commercial functions.	BEST	Master	Engineering or Science			

16	Simulation of Dehumidification of Ventilation Air with Enthalpy wheel and Cooling Coils – Case 2	The main objective is to conduct simulation study using TRNSYS program to study the performance of 3 system configurations that use enthalpy wheel, cooling coil and heat recovery coils operated under Thai climate to supply dry and cool ventilation air to air-conditioned spaces that are utilized under 3 residential functions.	BEST	Master	Engineering or Science			
17	A study on comparative energy performance and costs of windows with shading devices and roofs with insulation configurations.	The student will conduct experiments and simulation research on cooling load of residential and commercial spaces enclosed by exposed envelope comprising glazed window shaded by external devices, internal devices, and devices enclosed between two glass panes, and similar research on the use of coating on window glass.	BEST	PhD	Engineering or Science			
18	A study on daylighting through enhanced light pipes	The student will conduct a series of consultations with building design architects and engineers to select a number of reference building interior configurations suitable for application of daylighting through light pipes.	BEST	PhD	Engineering or Science			

Name of Advisor : Dr. Athikom Bang Bangviwat

1	Price and Income Elasticities of Electricity Demand	Investigation of relationship of demand on electricity and price/income by a field survey and economic model.	EEPL	M. Eng. M. Sc.	B. Eng./B. Sc./B. Econ.	JGSEE	Ability to carry out survey for field information	
2	Willingness to Pay for Electricity from Renewable Energy	Determination of willingness to pay for electricity from renewable energy by a field survey and economic model.	EEPL	M. Eng. M. Sc.	B. Eng./B. Sc./B. Econ.	JGSEE	Ability to carry out survey for field in	

Name of Advisor : Dr. Patrick Rousset

1	Effects of inorganic matters on pyrolysis of biomass (collaboration with CIRAD, France)	<p>Materials are essentially a composite of carbohydrate polymers with a small amount of inorganic matter and low molecular weight extractable organic constituents.</p> <p>The study will consist to identify the effect of inorganic on the pyrolysis product yield.</p> <p>A special attention would carry on the catalytic effects of these inorganic compounds on pyrolysis.</p>	AFPL	PhD and MS	Chemical Engineering / Chemistry	Living expenses 6,000 €/m		
2	Investigated the composition of torrefaction condensable gases from different Asian biomasses(woody and non woody biomasses) using catalyst	<p>The study will consist in testing different torrefaction parameters and different chemical composition of biomass to characterize the liquid fraction.</p> <p>How the biomass composition (ie relative levels of Cellulose, Hemi- cellulose and Lignin) effects the behavior and final pyrolysis products?</p>	AFPL	PhD and MS	Chemical Engineering / Chemistry	Living expenses 6,000 €/m		
3	Effects of pressure on biomass pyrolysis for coal blend used in pulverized coal injection	Recent studies have shown that using pressure can increase gravimetric yields by 50% and considerably reduce carbonization time. The purpose of this study is:	AFPL	PhD and MS	Chemical Engineering / Chemistry	Living expenses 6,000		

		<ul style="list-style-type: none">• to study how pressure impacts on the quality of the resulting charcoal.• To evaluate the utility potential of pretreated biomass in blast furnaces, the fuel properties, including fuel ratio, ignition temperature, and burnout, of bamboo, oil palm, rice husk, sugarcane bagasse, (to be defined) carbonization are analyzed and compared to those of a high-volatile coal and a low-volatile one used in pulverized coal injection (PCI).I				฿/m		
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I. Development of small/medium scale biomass gasification for heat and power production

Research theme	Topic	Contact person
Biomass pretreatment	<ul style="list-style-type: none"> • Production of low cost activated carbon • Torrefaction of mixed agricultural waste • Effect of pyrolysis conditions for biochar quality 	Dr.Patric Rousset patrick.rousset@cirad.fr
	<ul style="list-style-type: none"> • Design and optimisation for biomass torrefaction process • Study of biomass torrefaction under pressure 	Assoc. Prof. Dr. Nakorn Worasuwanarak nakorn@jgsee.kmutt.ac.th
Gasification process	<ul style="list-style-type: none"> • Comparing gasification of torrefied and raw biomass: the effect of minerals 	Dr.Patric Rousset patrick.rousset@cirad.fr
	<ul style="list-style-type: none"> • Development of pilot-scale tar removal process: design and optimisation testing • Investigating co-combustion of coal and biomass in a lab-scale test rig simulating conditions in CFB boiler • Performance testing of newly developed tar removal process under different conditions 	Assoc. Prof. Dr. Suneerat Fukuda suneerat@jgsee.kmutt.ac.th

I. Development of small/medium scale biomass gasification for heat and power production

Research theme	Topic	Contact person
End-use utilization i.e. of product gas, treated biomass	<ul style="list-style-type: none"> • Development of syngas fuelled engine for small scale biomass gasifier • Improving combustion characteristics of syngas under engine conditions 	Asst.Prof.Dr.Yossapong Laoonual yossapong.lao@kmutt.ac.th
Policy	<ul style="list-style-type: none"> • A Study of Impact of External cost, Wheeling charges, and Transmission Losses on Electricity Cost 	patrick.rousset@cirad.fr
	<ul style="list-style-type: none"> • Economic model to compare centralized and decentralized biomass pellet production 	Dr.Patric Rousset patrick.rousset@cirad.fr
	<ul style="list-style-type: none"> • Assessment of biomass value chain for sustainable utilization in Thailand: proposed alternative development scenarios (collaboration with KIT & STIPI) • Techno-economic assessment of biomass gasification for heat application in ceramic industry: a selected case study 	Assoc. Prof. Dr. Suneerat Fukuda suneerat@jgsee.kmutt.ac.th

II. Development of high-rate biogas technology and utilization

Research theme	Topic	Contact person
High-rate biogas technology	<ul style="list-style-type: none"> Dry fermentation 	Assoc. Prof. Dr. Sirintornthep Towprayoon sirin@jgsee.kmutt.ac.th
	<ul style="list-style-type: none"> การเพิ่มประสิทธิภาพระบบบำบัดแบบไม่ใช้อากาศสำหรับน้ำเสียจากกระบวนการผลิตน้ำยางชั้นด้วย Zero valent iron 	Assoc Prof. Dr. Chantaraporn Phalakornkule cphalak21@yahoo.com Dr.Warinthorn Songkasiri warinthorn@biotec.or.th
	<ul style="list-style-type: none"> การพัฒนากระบวนการบำบัดแบบไม่ใช้อากาศสำหรับน้ำเสียจากกระบวนการผลิตน้ำยางชั้น (Sulthane) 	Pornpan Panichnumsin opormsin@kmutt.ac.th
	<ul style="list-style-type: none"> การศึกษากลุ่มเชื้อจุลินทรีย์ในการบำบัดน้ำเสียจากปาล์ม ที่มีผลต่อการกำจัด S กับ N พร้อมกัน 	Assoc.Prof.Dr.Pawinee Chaiprasert Pawinee.cha@kmutt.ac.th
	<ul style="list-style-type: none"> Improvement of pretreatment and dry fermentation of Napier grass for biogas production Energy efficient wastewater treatment using anaerobic membrane bioreactor 	Sumate

II. Development of high-rate biogas technology and utilization

Research theme	Topic	Contact person
High-rate biogas technology (Cont'd)	<ul style="list-style-type: none"> Cultivation of microalgae for methane purification and biodiesel production 	Benjamas/Sumate
	<ul style="list-style-type: none"> Optimization of oxidation state to enhance biogas production of rubber industry wastewater 	Sumate/Piyarat
	<ul style="list-style-type: none"> Production of long chain fatty acids in anaerobic environment 	Sumate/Duangporn
	<ul style="list-style-type: none"> Improvement of element recovery and anaerobic digestibility of oil palm empty fruit bunch for biogas production 	Sumate/Boonya
	<ul style="list-style-type: none"> Effect of antibiotics on mechanisms of anaerobic digestion 	Sumate/Piyarat
	<ul style="list-style-type: none"> Enhancing biogas production from palm oil mill effluent by disturbing phenolic compound inhibition 	Sumate/Oramas

II. Development of high-rate biogas technology and utilization

Research theme	Topic	Contact person
High-rate biogas technology (Cont'd)	<ul style="list-style-type: none"> Hydrogen production from microalgal cells 	Sumate/Benjamas
	<ul style="list-style-type: none"> Pretreatment of Para wood sawdust to enhance hydrolysis and anaerobic digestibility for biogas production 	Boonya/Sumate
Advanced Anaerobic Microbiological Center	<ul style="list-style-type: none"> Effective Anaerobic Granulation 	Pawinee/Benjaphon
	<ul style="list-style-type: none"> จุลินทรีย์ anaerobic microorganisms 	Pawinee/Thanaporn/ Benjaphon
Biogas upgrade and utilization technology	<ul style="list-style-type: none"> Pressure Swing Adsorption Technology for Biogas Upgrade 	Assoc Prof. Dr. Chantaraporn Phalakornkule cphalak21@yahoo.com
	<ul style="list-style-type: none"> H₂S bio-scrubber 	Annop

II. Development of high-rate biogas technology and utilization

Research theme	Topic	Contact person
Policy	<ul style="list-style-type: none">Development of Decision Support System for Biogas Technology of Cellulosic Materials	Dr.Warinthorn Songkasiri warinthorn@biotec.or.th Assoc Prof. Dr. Chantaraporn Phalakornkule cphalak21@yahoo.com
	<ul style="list-style-type: none">Biogas Industry Strategies in Thailand	Annop/Warinthorn
	<ul style="list-style-type: none">LCA/Carbon footprint/Water Footprint	

III. JGSEE-NSTDA Integrative Biorefinery Laboratory (IBL)

Research theme	Topic	Contact person
Biomass pretreatment and fractionation	<ul style="list-style-type: none">• Characteristics of isolated cellulose and lignin from the clean fractionation of various biomasses (e.g. agricultural residues, soft and hard woods, woody biomass)• Determination of suitable pretreatment/fractionation approaches and conditions for different applications and utilizations of biomasses (e.g. for fuel, chemical, bio-material productions)• Separation/precipitation of lignin from waste black liquor in paper industries by various processes (e.g. acidification, sub- or super-critical CO₂, oxidation)• Process intensification and scaling up of biomass clean fractionation	Prof.Dr.Navadol Laosiripojana navadol@jgsee.kmutt.ac.th Dr.Verawat Champreda verawat@biotec.or.th

III. JGSEE-NSTDA Integrative Biorefinery Laboratory (IBL)

Research theme	Topic	Contact person
<ul style="list-style-type: none">• Development of biomass-degrading enzymes• Conversion of sugar to fuels and chemicals	<ul style="list-style-type: none">• Development of suitable enzymes for proper hydrolysis of pretreated and fractionated biomasses to sugar• Development of suitable and low-cost catalysts (i.e. thermo-chemical and photo-catalysts) for converting isolated cellulosic compounds to fuels and value-added products• Process and reaction optimization (e.g. hydrolysis, dehydration, deoxygenation, photo-catalysis) to maximize the yield and selectivity of specific products from the conversion of isolated cellulosic compounds• Process intensification and scaling up of isolated cellulosic compound conversion to specific products	<p>Prof.Dr.Navadol Laosiripojana navadol@jgsee.kmutt.ac.th</p> <p>Dr.Verawat Champreda verawat@biotec.or.th</p>

III. JGSEE-NSTDA Integrative Biorefinery Laboratory (IBL)

Research theme	Topic	Contact person
<ul style="list-style-type: none">• Conversion of lignin and bio-wastes to fuels	<ul style="list-style-type: none">• Investigation of catalyst and solvent systems for depolymerization of isolated lignin to specific products• Process and reaction optimization (e.g. depolymerization, deoxygenation, photocatalysis) to maximize the yield and selectivity of specific products from the conversion of isolated lignin• Purification of products from lignin conversion• Process intensification and scaling up of isolated lignin conversion to specific products	Prof.Dr.Navadol Laosiripojana navadol@jgsee.kmutt.ac.th Dr.Verawat Champreda verawat@biotec.or.th
First and second generation biodiesel production	<ul style="list-style-type: none">• Investigation of solid catalyst and for deoxygenation of palm feedstocks to long-chain alkane compounds• Development of continuous operation FAME production from palm feedstocks	Prof.Dr.Navadol Laosiripojana navadol@jgsee.kmutt.ac.th Dr.Verawat Champreda verawat@biotec.or.th