

Division of Mechanical Science and Engineering	Research field	Environmental protection and Energy systems	Lab. ID MS30
Laboratory web site	<a href="http://www.me.se.kanazawa-u.ac.jp/gijutsu/">http://www.me.se.kanazawa-u.ac.jp/gijutsu/</a>		
Research subjects			
<p>The energy-saving, the environmental clean-up and the energy production technologies for the construction of the sustainable society have been broadly developed in our laboratory based on the concept of "clarification and controlling of the heat and mass transport". For the energy saving technologies, the adsorptive desiccant cooling process which can drive using low grade waste heat and the technology based on the adsorption for the efficient use of the low-grade heat have been developed. For the environmental clean-up technologies, small size desulfurization filter for the clean-up of the effluent gas from the diesel engine and the gas enrichment/ purification process using adsorbent have been developed. For the energy production technology, the direct liquid fuel cell, which directly uses liquid fuel such as methanol and formic acid for the good handling and storage characteristics has been developed.</p>			
Master/Doctor course: Education policy, curriculum, typical activity in the laboratory			
<p>The staffs expect for the students to learn the abilities, which are the finding and the solving the problem, themselves. Therefore, the staffs recommend for the students to set the goal themselves and repeat the experiment themselves for the goal achievement after the staffs provide the research theme. In order to cultivate these abilities, the seminars reported the research progress of the student (once per three weeks) and summary of the research achievement in the semesters (once per each semester) have been conducted. Moreover, the student is required to read the paper reported the state of the art of the research field and introduce it for the laboratory member (once per each semesters).</p> <p>For the Doctor course students, the staffs expect to establish the research theme, goal and the solving method of the goal, by themselves with the advice from the staffs.</p>			
Daily life in the laboratory, etc.			
<p>We set the core time to avoid doing experiment alone from the viewpoint of the consideration of the security. Owing to the core time, the students can create good bonding with each other irrespective of the research field since all member meets at the same time in core time.(Staff)</p> <p>We can learn ourselves since the experiment is conducted after we constructed experimental set-up ourselves (M2)</p> <p>Not only the research work but also the sports (badminton etc.) is conducted in our lab. Moreover, the drinking-party is held once per month. Through these activities, we can cement our partnership.(M2)</p>			
Message or comments by the laboratory faculty staffs			
<p>Our research works closely relate with the field of "chemical" although the our laboratory belongs to the "mechanical division". So, you can be the engineer who can deal with not only the mechanical technology but also the chemical reaction through the research work in our lab. Of course, there is no problem if you have no knowledge on the chemistry as long as you have ambition.</p> <p>There is one student who enters in our laboratory from the other university per a year. After completion of the master course, the majority of students gain employment with the ordinary companies.</p> <p>For the doctor course, the students who complete the course get a job in university or the ordinary companies. Moreover, 1-2 students (average) including the students who enter from the company get a degree of doctor per year in our lab.</p>			
Recent Master theses in these 3 years (+ more if appropriate)			
year.month	Thesis title (including English translation of Japanese thesis title)		
2017.3	Study on adsorption behavior of water vapor onto an adsorbent coated on the heat exchanger and improvement of its dehumidifying performance		
2017.3	Simultaneous enrichment of methane and carbon dioxide of biogas by TSA with a heat exchangeable adsorption column		
2017.3	Development of the fuel cell catalyst using metal nano particle stabilized by polymer dispersing agent		
2017.3	Influence of coexisting water vapor on the performance of biogas separation by PSA		
2017.3	Development of formic acid production process by electrochemical reduction of carbon dioxide		
2016.9	Experimental study on a batch type continuous desiccant dehumidification / air-conditioning process employing adsorbent-heat exchanger.		
2016.3	Development of ultrahigh power and durable catalyst for direct formic acid fuel cell		
2016.3	Experimental study of desiccant dehumidification and heating for agricultural greenhouse		
2016.3	Study on the low temperature activation of dry DeSOx filter by exhaust gas reforming		
2016.3	Characterization of the cell structure for the high power direct formic acid fuel cell		
2016.3	Fundamental study on hydrogen isotopes adsorption by using quantum molecular sieving effect		

2016.3	Water vapor adsorption – desorption behavior of the desiccant rotor with different pore sizes distribution
2015.3	Influence of the shape of the adsorption isotherms on the dehumidifying performance of the silica gel desiccant rotor and its factors
2015.3	Study on the batch-type dehumidifying process using adsorptive heat exchanger.
2015.3	Fundamental study on the temperature rise of the low grade heat using adsorption heat
2015.3	Study on the miniaturization for the desulfurization filter by the substrate-less honeycomb structure
2015.3	Study on the behavior of the water vapor diffusion in the silica-gel layer using volumetric method
2015.3	Development of the anode catalyst for the direct formic acid fuel cell using hyper branched polymer
2015.3	Study on the electrode structure of the direct formic acid fuel cell for the stable operation
2014.9	Performance evaluation and applicability of the desiccant cooling processes
2014.3	Analysis of the energy consumption derived to the air conditioning in the natural science and technology buildings of Kanazawa university and suggestion of the energy utilization using off-grid power system
2014.3	Study on the adsorption ability of the desiccant wheel and its developing for the agricultural field
2014.3	Separation and enrichment of the methane-carbon dioxide-water mixture gas by pressure swing adsorption
2014.3	Study on the modeling of CO2 separation/enrichment process using thermal swing adsorption based on the vapor desorption
2013.3	Influence of the regeneration condition of the CO2 separation with TSA based on the vapor desorption
2013.3	Bio-gas (methane, water vapor, carbon dioxide) separation with pressure and thermal swing adsorption
2013.3	Clarification of the behavior of the open-cycle adsorptive heat storage and it's applying for the air conditioning of the vehicle.
2013.3	Designing for the dry desulfurization filter driving at low temperature range of the engine effluent gas
Recent Doctoral theses in these 3 years (+ more if appropriate)	
year.month	Thesis title (including English translation of Japanese thesis title)
2014.9	Study on the low dew point air production using water vapor adsorbent rotor and its operation concept
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