

# List of Dissertation Abstract

## (Risk Management and Environmental Sciences Safety Management Course)

Name	Supervisor	Title	Abstract
Xu YAO	Naoya KASAI	Research about the miniaturization of RFECT probe	Steel plate is always used in the oil,chemical plant. But the severe operating environment will cause corrosion and cracks on the steel plate. For detecting, we need a miniaturized and sensitive detector. In this paper, writer confirmed the output of the flaw's signal by experiment. And then analyzed the RFECT phenomenon and proposed a new detecting probe by FEA analysis.
Takuya IRITANI	Hideo OHTANI	Effects of oils of ferrocene-containing microemulsions on their fire extinguishing performance	Ferrocene-containing microemulsions have been confirmed to effectively produce the fire extinguishing performance from ferrocene, but effects of other than ferrocene concentration and surfactant have not been studied. In this study, the effects of oils of ferrocene-containing microemulsions on their fire extinguishing performance was investigated. Fire extinguishing experiment was conducted using pool fire and measured fire extinguishing time and gas phase temperature. As a result, when n-alkane having 5 to 8 carbon atoms was used, microemulsion using pentane showed the best fire extinguishing performance.
Ayaka KAWAI	Naoya KASAI	Development of a chloride ion sensor using a optic fiber	In this research, a new sensor model that detects low concentration chloride ion with high sensitivity was proposed. Since corrosion of structures such as bridges and piping is adversely affected by chloride ions, a technology for detecting chloride ions contained in atmospheric sea salt particles is required. There are many advantages for optical sensors using optical fibers, whereas with existing sensors there remains a problem in detecting the low concentration range required for structure monitoring. In this research, a novel sensor using Ag as a sensitive material and an optical fiber as a sensor body was fabricated, succeeded in detecting 1 ppm chloride ion, and a high robustness sensor system was successfully constructed by examining the optical measurement method.
Tomoki KAWARA	Takeshi KOBAYASHI	Dissolution behavior of chloroethylenes from long-term contaminated soil and prediction of expansion in aquifer	Chloroethylenes have been used in large quantities in the past as cleaning solvents at business establishments and numerous soil contamination has become apparent. In this study, long-term elution behavior from loam, andosol and sandy soil to groundwater was measured and analyzed, and elution promotion effect during heating purification was confirmed. In addition, using the experimental data obtained by desorption diffusion experiments and the behavior prediction formula of chloroethylenes in the aquifer, it was possible to estimate the extent of contamination by chloroethylene classified by soil in the aquifer.

Kenta KUROKI	Atsumi MIYAKE	Condensed phase reaction mechanism analysis of the decomposition of hydroxylammonium nitrate aqueous solution	Hydroxylammonium nitrate (HAN) aqueous solution (aq) has been considered as useful monopropellant replacement for hydrazine because of low toxicity, environmental safety, high density, and low freezing point. However, HAN aq often exhibits extremely high burning velocity, therefore it is difficult to control burning velocity. Previous study showed that condensed-phase reaction have a great effect on burning velocity. It is important to establish a detailed condensed-phase reaction model of HAN aq. In this paper, to establish chemical reaction model, we analyzed condensed phase reaction of HAN aq by using simulation and reaction gas analysis.
Koki SAOTOME	Naoya KASAI	Development of optical fiber AE measurement system with resonance	In this research, we studied for developing inexpensive AE sensor without temperature influence. Therefore, we propose vibration detection method combining optical fiber and mirror and confirmed that vibration detection by this method is possible. In addition, we propose a method to improve sensitivity by resonance and succeeded in detecting vibration component of high frequency by using the sensor. Furthermore, from the experiment using the grating, the possibility of further improving the sensor sensitivity was shown.
Yuma SASAKI	Takeshi KOBAYASHI	Proposal of health risk assessment method considering fugitive dust from heavy metals soil contaminated sites.	Health risks due to inhaling scattered contaminated soil particles are more concerned around soil contaminated areas, such as heavy metals, which are low in mobility in soil and remain to contamination on soil surface. In this research, in order to propose a risk assessment method that can take into consideration scattering of soil particles affected by changes in soil quality, grain size, soil volumetric water content and persistence of heavy metals in surface soil, we devised calculation formula of scattering speed with reference to research and examined appropriate calculation conditions and parameters.
Hiroki SHINOZAKI	Naoya KASAI	Research about the effect of corrosion products on Atmospheric corrosion monitoring sensor	For the purpose of developing Atmospheric Corrosion Sensor based on Strain Measurement, I conducted experiments and analyzes with the aim of verifying and eliminating the effect of corrosion products, which is an error factor. Experiments were conducted to corrode only one side of a thin metal test piece and it was confirmed that the corrosion product had a mechanical effect. In order to remove the effect of corrosion products, I proposed a specimen model with dummy FBG. We evaluated the validity of the model by FEM analysis and showed that it is possible to remove various error factors such as corrosion products and temperature.

Ryunosuke SUGA	Yasushi OKA	Prediction of fire-induced thermal flow in tunnels or long corridors based on numerical analysis	The flow characteristics of hot air flow attracted by a fire generated in a space having an elongated rectangular cross section such as a corridor or an underground shopping center in a building are different from ordinary teaching space fire. In particular, it can be said that consideration of the method of defining the thickness of hot air flow and the influence of the cross sectional shape are insufficient in the past research. Therefore, in this study, based on numerical experiments, considering the thickness of the hot air flow and the distribution in the hot air flow, considering the representative length applicable to a horizontally elongated space having a rectangular cross sectional shape, the flow characteristics of the hot air flow Was examined.
Risa SUZUKI	Atsumi MIYAKE	Process hazard analysis on the treatment facility of industrial liquid waste	There is a possibility of trouble due to an unexpected reaction caused by mixing of the received liquid waste the already-existing liquid waste in the tank. The purpose of this study is approach of process hazard analysis (PHA) that can evaluate hazard in stages by quantifying the energy. We established limiting values of temperature change by mixing the energy density and quantifying method of holding energy of received liquid waste.
Ikkei TANABE	Mieko KUMASAKI	Conceptualisation of disaster mitigation activities and examination for safety planning	In my research, first I conceptualize disaster mitigation activities by grounded theory approach. As the result, I made concept classification which was composed of 4 categories and 15 concepts. Secondly, I investigated the effects of concept classification for planning of disaster mitigation activities by impact evaluation. In impact evaluation, I conducted a questionnaire survey of college students. As the result, I could make sure that usage of concept classification increase number of responses about disaster mitigation activity and diversify response of it.
Shota TSUBOI	Tadahiro SHIBUTANI	Proposal of abnormality detection method for electronic system using HALT and machine learning	HALT attracts attention as a technology to prevent failure of complicated electronic system on the market. However, there is a problem that there is no effective method for analyzing the progress of failure. In this study, I analyzed the progress of failure of electronic system in HALT by machine learning. As a result of the analysis, it was found that anomaly of electronic system can be captured by using Gaussian graphical model. This confirmed the superiority of using machine learning in HALT.

Masanobu DOI	Mieko KUMASAKI	Study on new risk assessment applying probability to runaway reaction	Safety management based on risk assessment is used in various situations not only chemical plants. Risk assessment needs probabilities. However, probability of runaway reaction is not considered. Runaway reaction is a phenomenon in which the reaction rate abnormally increases by which the heat generating exceeds the cooling in reaction process. Runaway reaction has caused accidents including casualties. The purpose of this study is applying probability of runaway reaction to risk assessment. This study can develop risk assessment in chemical plants.
Keiichi NISHIHATA	Masahiko MATSUMIYA	Development of dye-sensitized solar cell by synergetic effect of novel TCB-based ionic liquid electrolyte and conductive polymer film	The photovoltaic performance and the physicochemical property related with a dye-sensitized solar cell (DSSC) using "novel TCB-based ionic liquid (IL)" as an electrolyte were analyzed in this study to enhance durability and conversion efficiency of DSSC. In addition, the synergetic effect combined the IL electrolyte with a conductive polymer film (PEDOT film) was also evaluated on photovoltaic performance for DSSC.
Tatsuya HAMADA	Tadahiro SHIBUTANI	Cost simulation of failure rate improvement by PV system HALT	The trend towards IoT society is accelerating with the backdrop of human resources shortage, and demand for electronic products will increase more and more development competition will be intensified. In Japan, it takes time to evaluate reliability as an issue. Therefore, by introducing a destructive test HALT, analyzing the development delay avoidance cost, the factory defect rate, the guarantee avoidance cost by improving the reliability, and the ROI on shortening the reproduction test, should companies introduce HALT We made a cost indicator of.
Taishi MASHITA	Yasushi OKA	Consideration of System Construction based on Reflection Index of Respiration for Fire-fighting Management	Firefighting is one of physically and mentally stressful activities in pretty harsh environmental condition. Physical monitoring of fatigue is useful for getting a better occupational safety management through improving the efficiency of firefighting activities, preventing incidents and accidents during firefighting, and reducing human errors due to losing concentration. We tried to construct a prototype system using wearable terminal and cloud computing method. We verified the availability of the system by applying it to training assuming large-scale disasters. We examined the rest time from the alert for stopping the activity to return to the site.

Naoki YANO	Tadahiro SHIBUTANI	Elucidation of influence by test object fixation position in 6-axis random vibration test	In the 6 axis random vibration test which is expected as the extraction test of the weak part of the product in the development stage, the vibration of the vibration table accurately transmitted to the test object, especially the electronic product on the board. By comparing the result of the vibration test using the metal substrate with the analysis result of the past and specifying the vibration mode, when the fixed condition is changed, the vibration mode of the substrate changes, and the effect of the fragile part extraction test is influenced by fixed position.
Nana YAMAKI	Atsumi MIYAKE	Thermal hazard analysis for chemical process using ionic liquids	Ionic liquids (ILs) may have applications as less hazardous solvents. However, their decomposition products of ILs can include flammable or toxic gases. Because chemical processes using ILs on an industrial scale are still in the early phase of development, it is important to assess the associated thermal hazards. In the present work, the thermal hazards associated with the dissolution of cellulose during biomass pretreatment using ILs were examined. Hazards of thermal runaway are minimal during the IL processing, although ILs decomposition might form combustible gases in a reactor and appropriate systems for monitoring and removing flammable gases should be in place.
Kasane YOSHIDA	Takeshi KOBAYASHI	Remediation promoting factors in thermal-enhanced biostimulation of chloroethylenes contaminated soil	To promote bioremediation, which is a measure against soil contamination of chloroethenes at low environmental impact and low cost, it is important to shorten the purification period and establish a prediction method. In this study, the influence of possible influence factors on the biodegradability of chloroethenes degrading bacteria was investigated. The influence on the decomposition rate constant in the examined range is the temperature (30 ° C.)> the soil particle size (500 to 4750 μm)> ORP (-130 to -100 mV), and the influence of the concentration of the purifying agent and the coexisting microorganisms was also thought.