List of Dissertation Abstract

（Risk Management and Environmental Sciences　Safety Management Course）

Name	Supervisor	Title	Abstract
Liu XIAO	Naoya KASAI	Research on development of corrosion monitoring system with 4 gauge method	Techniques for evaluating corrosive environments of social structures now has low accuracy. In order to develop a monitoring system that can observe high accuracy and long time, Kasai laboratory fabricated a strain amplification circuit. In this research, we conducted a corrosion monitoring experiment using a 4-gauge method and conducted a corrosion monitoring experiment in order to reduce the effects of temperature change and noise.
Shu AOYAMA	Tadahiro SHIBUTANI	Proposal of Reliability Assessment Method of Automated Driving System Utilizing Human Reliability Assessment Method	Regarding the risk assessment of automated driving, the problem is how to evaluate the behavior of the system against a varied surrounding environment. At that time, in addition to the conventional evaluation method focusing on the reliability of the internal components, it supposed to be necessary to implement an evaluation method focused on human-like error by the system while considering external influences. This study evaluated the automated driving system by Human Error Assessment and Reduction Technique (HEART) which is a human reliability evaluation method, and summarized the problems.
Tomoya ISHIMARU	Mieko KUMASAKI	Study on safety intervention to change the safety behavior of workers	The number of occupational accidents in Japan is decreasing, but the tendency to decrease has slowed. A large number of workers still suffer from it. One of the most important remedies to overcome the current situation is that changing safety attitudes of workers by improved interventions. However, from the trend of the number of accidents caused by occupational injuries, the effect of prevention of injuries by safety measures has not contributed much. As a new viewpoint on workplace accident prevention, understanding how behavior change will enable effective safety interventions in the work place.
Hisashi OTA	Masahiko MATSUMIYA	Development of purification for rare earths from Nd-Fe-B magnets by hydrometallurgy and electrodeposition using low temperature molten salts	This study was focused on a novel bench-scale hydrometallurgical procedure and electrodeposition using low temperature molten salts for the recovery of rare earths from spent Nd-Fe-B magnets. The investigation was performed at bench scale process based on leaching, deironization, and purification of rare earth amide salts. Finally, a series of material flow indicated the effectiveness of the novel recovery process for practical use.

Daichi KUBO	Takeshi KOBAYASHI	Effect of elevated temperature on adsorption equilibrium and elution rate of volatile organic compounds in soil and construction of soil dissolution prediction model	By warming underground using exhaust heat, chlorinated volatile organic compounds in soil are eluted in groundwater,. In this way, there is a possibility that efficiency of the water lifting aeration treatment process can be improved. In this study, to determine the dissolution promoting effect of chlorinated volatile organic compounds by heating, the adsorption equilibrium and dissolution rate at different temperature conditions were measured and analyzed. By heating from 15 to 40℃, the soil adsorbability decreased approximately 40,50, 30,20% with tetrachlorethylene trichloroethylene, dichloroethylene, chloroethylene. Moreover, about 1.3 times in Sand, 1.3 times in loam soil, has been shown that dissolution rate becomes faster.
Keita KURIBARA	Masahiko MATSUMIYA	Analysis of solvation structure for rare earth complex and evaluation of thermodynamic property by Raman spectroscopy and DFT calculation	The purpose on this study was focused on the analysis of solvation structure for rare earth (Pr, Nd, Dy) complexes. The solvation number for rare earth complexes and thermodynamic property of ligand were evaluated from Raman spectroscopy. Moreover, the model of rare earth complexes was designed on this study. Finally, the binding energy, the partial charge and the complex state were evaluated from the optimized structure by DFT calculation.
Wataru SUE	Kasai NAOYA	Study on AE generation behavior of steel materials focusing on strain localization	In this study, we tried to evaluate the void damage of the steel material during the tensile test. Specifically, the AE during tensile test was measured by preparing test pieces with flat plate and grooves of two kinds of steel types with different destruction modes. Then we considered the relationship between AE and the void damage process until the steel material was destroyed. In addition, the localization of the strain of the specimen during the tensile test was simultaneously measured. Then we examined the relationship between generation and growth of voids and AE.
Takuya HAGA	Hideo OHTANI	Combustion Inhibition Effects of Ca Compounds	In this study, we aimed to evaluate the inhibition effects of calcium by using calcium compounds with anions which have no combustion inhibition ability, i.e., calcium acetate, calcium hydroxide, calcium nitrate, and calcium oxide. The inhibition effects were evaluated by measuring the downward flame spread rates over narrow thin filter-paper sheets on which each Ca compound was adsorbed. The results showed that the inhibition effects are not observed for calcium nitrate and calcium oxide, whereas calcium hydroxide and calcium acetate show the inhibition effects. Our previous study revealed that, for iron compounds, the inhibition effects are negatively correlated with the binding energy. We found a similar trend for the Ca compounds used in the present study.

Takashi HASEGAWA	Hideo OHTANI	Explosion properties of n-alkene/nitrous oxide mixtures	The explosion properties of alkene/nitrous oxide (N_2O) mixtures were investigated. In addition, this study explored the explosion limits of alkane/alkene/N_2O mixtures and evaluated the applicability of Le Chatelier's rule and VAFT method to those mixtures. For alkane/alkene/N_2O mixtures and alkene/alkene/N_2O mixtures, Le Chatelier's formula successfully predicted their lower explosion limits, while the applicability of the rule was less adequate for their upper explosion limits. VAFT method predicted upper explosion limits more accurately than Le Chatelier's rule. We found that VAFT model can be used for new estimation method of upper explosion limits.
Mamoru HAYATA	Atsumi MIYAKE	Thermal ignition of energetic ionic liquid propellant	In this study, we investigated thermal ignition property of enretic ionic liquid propellants expected as new monopropellant. As thermal ignition method, laser ignition is selected. We researched thermal ignition property when heating propellants using laser. In this result, energetic ionic liquid propellants were ignite by laser heating. For predict ignition delay time, temperature rise ignition model was constructed considered of thermal decomposition rate, laser condensing, and absorption. Thermal decomposition rate is predicted using kinetics analysis.
Kenya HINATA	Yasushi OKA	Study on ceiling-jet property considering the difference of rectangular cross-section shape	The properties of a ceiling-jet propagating along the ceiling of a tunnel with specific spatial characteristics are fundamentally different from those under an unconfined ceiling because the ceiling-jet in a tunnel is influenced by the sidewall and differs depending on the presence or absence of forced ventilation. The objective of current work is to examine experimentally in detail the ceiling-jet properties propagating along the tunnel axis from the point of view of both of temperature and velocity and to develop easy-to-use empirical correlations to represent the temperature and velocity distribution of the ceiling-jet considering the effect of rectangular cross-sectional shape of the tunnel.
Ryoma HIRATA	Tadahiro SHIBUTANI	Failure Mode Estimation Utilizing Analog Simulator in HALT	In this study, an analog simulator was introduced as a failure mode estimation method in Highly Accelerated Life Testing (HALT). Voltage anomaly of a small operational amplifier circuit board was analyzed by creating fault circuit models. The failure mode confirmed by HALT was estimated from the FMEA sheet prepared from the analysis result.

Tomohiro HOMMA	Atsumi MIYAKE	Studies on runaway reaction assessment method in distillation process for solvent recovery	In recent distillation process for solvent recovery, compositions of waste solvents have become diversified by globalization of materials which are used in suppliers of waste solvents. For this reason, it is concerned that unexpected impurities mix to the distillate. Unexpected impurities are likely to cause a runaway reaction of solvents. This study developed an assessment method of runaway reaction that process operators can properly determine an analytical sample and experimental method for the analytical sample at the stage of hazards assessment.
Shouta YAMAMOTO	Tadahiro SHIBUTANI	Fatigue limit and hydrogen resistance evaluation of high pressure hydrogen-resistant material XM-19	I aimed to acquire fatigue property and evaluate hydrogen resistance of XM-19. Fatigue test and SEM were used to estimate fatigue limit and ftigue crack growth characteristics. The composition of the metal surface was examined with XPS. When the surface was scratched, XM-19 was found to be easily broken and the oxide film disappeared.
Yohei YAMAMOTO	Hideo OHTANI	Fire Extinguishing Capability of Aqueous Solutions of Organic Solvents	This study investigated the abilities to extinguish n-heptane pool fires of aqueous solutions of organic solvents and the effects of spray characteristics, evaporation rate and flammability on the suppression efficiency. The concentrations of their organic solvents were varied between 1 and 20 vol%. Results confirmed that (1) Ethanol and 1-propanol solutions exhibit 3–5 times higher the extinguishing abilities than a conventional wet chemical (i.e., 45 wt% aqueous solution of potassium carbonate) and (2) their suppression capability is strongly dominated by mass flux, which is one of the spray characteristics, and their flammability.
Kento YOTSUYANAGI	Yasushi OKA	Application of Mass-Consistent flow model to predict smoke flow behaviour in tunnel fire	It is very important to predict the heat flux behavior at the time of fire, and we tried to apply a simple wind speed field estimation model to tunnel fire property prediction in order to predict in a relatively short time. In this study, we used a numerical calculation program (FDS) to determine primary estimates at arbitrary positions in tunnels necessary for prediction.