

List of Dissertation Abstract

(Risk Management and Environmental Sciences Safety Management Course)

| Name | Supervisor | Title | Abstract |
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| Iruru AOKI | Takeshi KOBAYASHI | Temperature influence on soil adsorption equilibrium and dissolution rate of chlorinated volatile organic compounds | By warming ground using exhaust heat, chlorinated volatile organic compounds in soil is eluted in ground water, by pumping treatment, effectively there is a possibility of soil remediation. 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°C, the soil adsorbability decreased approximately 50, 30, 10% with trichloroethylene, dichloroethylene, vinyl chloride. By heating from 15 to 40°C, about 4 times in Black soil, 2.5 times in Sand, 3 times in loam soil, has been shown that dissolution rate becomes faster. |
| Sunao IIDA | Naoya KASAI | Study on the sophistication of the stress evaluation method by the Barkhausen noise | Non-destructive inspection method of stress, there is a Barkhausen noise (BHN) method. To the challenge of improvement of the calibration curve accuracy and complexity of the measurement, I tried to the elucidation of the BHN output trend by domain observation at the time of stress load, and the development of 360 ° BHN measurement system using a circular rotating magnetic field by the three-pole magnetization unit. In two kinds of steel plate, describes qualitatively BHN output trend from the domain structure changes. From BHN measurement test in residual stress, it demonstrated the BHN measurement of 360 ° of a circular rotating magnetic field. |
| Masataka ITAKURA | Atsumi MIYAKE | Eutectic mechanism analysis of ammonium dinitramide toward development of novel liquid propellants | Energetic Ionic Liquids (EILPs) is expected to use as novel liquid propellants. EILPs were obtained by mixing high energetic material, Ammonium dinitramide (ADN), with amide and amine nitrate. Eutectic phenomenon made these mixtures liquid at room temperature. Toward the development of the EILPs, understanding the physical property and perception of propellant designing are required. In this study, eutectic phenomenon was studied by melting point measurement, raman spectroanalysis and ab initio calculation. |

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| Shu Iwami | Yasushi Oka | The proposition of member's active possible area estimation method during a fire-fighting activity | Safety and efficient operation of fire-fighting may be expected by achieving fatigue control based on science basis in addition to experience of field leader and self-judgement of each member. Therefore, a threshold level of activity stop point and activity continuation with caution point was proposed. Three kinds of exercises were done by the fighters of fire department city of Yokohama and assessment of fatigue condition was conducted based on changes in the biological information (electrocardiographic R-wave, respiratory metabolism etc.) during these exercises. |
| Shunsuke KOMIDO | Takeshi KOBAYASHI | Study of the assessment method of a variety of health risk by the volatile organic contaminants in soil throughout air phase | A variety of risk assessment of volatile organic contaminants (VOC) in soil throughout air phase was carried out. Furthermore, the emission to the air phase from the soil was estimated and the absorption to soil was experimented and analysed. P_{OA} which is the estimated and measured value is almost same. Evaluated for the three VOCs, although the Environmental Quality Standard for soil is exceeded for severalfold, there will be no problem in health risk. Because the estimated hazard ratios of a variety of exposure scenario in the house on contaminated land were found to be sufficiently low. |
| Naoko SASAYA | Masahiko MATSUMIYA | Analysis of electrodeposition behavior for rare earth in ionic liquids on electrochemical quartz crystal microbalance at elevated temperature | We previously proposed an electrodeposition method using ionic liquids as an environmentally conscious technology for the recovery of rare earth metals. In this study, applicability of electrochemical quartz crystal microbalance (EQCM) at elevated temperature was proved, and the electrodeposition behaviors for Nd(III) in ionic liquids were investigated using the EQCM. As a result, the behavior of our objective electrodeposition was observed around -3.0 V vs. Fc/Fc ⁺ . On the other hand, in order to obtain electrodeposited Nd metal with high purity, it is important to control the negative potential considering from the overpotential and to maintain the highly-concentrated Nd(III) in ionic liquids. |
| Tomohide TAKAHASHI | Hideo OHTANI | A study of flame inhibition mechanism of vanadocene | In this study, we focused on vanadocene, which is only metallocene exhibited flame inhibition effect in solid-phase. Vanadium oxides (V ₂ O ₃ , V ₂ O ₄) assumed to be solid-phase flame inhibitor, but none of them exhibited flame inhibition effect. In this study, we improved method for evaluating solid-phase flame inhibition effect. Then, it was suggested that predominant effect of flame inhibition by vanadocene results from gas-phase negative catalysis. |

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| Naoto TOKUNAGA | Atsumi MIYAKE | Thermal decomposition mechanisms of Triazole derivative | In this study, focus material is 1,2,4-triazole-3-one (TO) for had stability and power in structure potentially and it made cracking mechanism of energy outbreak mechanism. The purpose of the research was take hold of the thermal decomposition mechanism of TO from the material which let add TO and a substituent, a change of the resolution mechanism in the oxidizer mixture. The present study investigated a thermal analysis for the heat behavior grasp of each material and performed generation gas analysis and qualitative analysis for reaction mechanism grasp with incandescence. The results suggested, TO was made progress decomposition moved from a hydrogen drawing reaction and showed exotherm by polymerization reaction. |
| Takuya TOMITA | Hideo OHTANI | Preparation and fire suppression efficiency of ferrocene-containing emulsions | Ferrocene is a flammable substance, but when the negative catalyst cycle by decomposition of the ferrocene are affected, it exhibits a high combustion inhibiting effect even in a small amount. Emulsions were prepared by dispersing the ferrocene dissolved in a solvent in water. By dissolving the ferrocene in a solvent, it is possible to control the ferrocene concentration. Moreover, the emulsion improves the stability of the system in the long-term storage, which is required as a fire extinguishing agent. It was evaluated the fire suppression efficiency of emulsions against the pool flame. |
| Takuya NISHIDA | Hideo OHTANI | Explosion characteristics of alkanes / nitrous oxide mixture on nitrogen additional condition | It is important to know explosive conditions for preventing gas explosion. However, despite the fact that some unexpected explosion accidents were caused by nitrous oxide (N ₂ O), few studies have been reported on explosion characteristics of flammable gases in N ₂ O atmospheres. In this study, we experimentally investigated explosion characteristics (e.g., explosion limit, explosion pressure, deflagration index) of alkane (carbon number: 1 to 7) – N ₂ O – N ₂ mixtures in a 0.94-L closed cylindrical vessel at ambient temperature and pressure. The explosion characteristics of the mixtures containing N ₂ O were compared with those of corresponding mixtures containing O ₂ . |
| Shiro HAGIWARA | Yasushi OKA | Temperature and velocity properties of a ceiling jet generated from a rectangular fire source impinging on an unconfined ceiling | Understanding the characteristics of ceiling jet flow is important because most fire detectors devices are designed to operate within region. In this study, using two types of rectangular fire source was compared with the square fire source. By comparison the results of rectangular fire source and the square source, revealed the move distance which varies from two-dimensional flow generated from a rectangular fire source to the nature of the square fire source. |

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| Ryuki HATAKEYAMA | Naoya KASAI | Evaluation for Void Damage by AE Method and FEM Analysis | To evaluate void damage as void nucleation and void growth which is the cause of ductile fracture of steel materials, I measured AE (acoustic emission) in case of the tensile test of the flat specimen and slotted specimen. I considered the void damage behavior using AE measurement result, void observation and the FEM analysis including ductile fracture criterion (GTN model). |
| Taiki FUJIOKA | Hideo OHTANI | Development of throwing fire-extinguishers for small fires | The main objective of the present study was to evaluate the suppression capabilities of aqueous solutions of inorganic salts for developing throwing fire-extinguishers. The suppression trials clearly demonstrated that (1) aqueous solutions of iron salts and potassium carbonate exhibit the high extinguishing capabilities and (2) the suppression efficiency is negatively correlated with the dissociation energy of iron salts. |
| Michiya FUJITA | Atsumi MIYAKE | Thermal hazard analysis on runaway polymerization of acrylic monomers | To clarify explosion mechanism accompany with runaway polymerization of acrylic monomers, amount of energy release and products in each progress event were analyzed. This study focused on acrylic acid, and revealed that Michael addition reaction not only induce monomer to start polymerization due to its exotherm but also Michael adducts generates larger amount of pressure than monomer. Therefore, accumulation of Michael adducts increase risk of crack initiation in tank. The accumulation of Michael adducts increase influence of explosion due to simultaneous vapor explosion of unreacted monomer and generated water in lower filling ratio tank. |
| Takahiro YAMADA | Masahiko MATSUMIYA | Evaluation for extraction properties and stability of extracted rare earth complexes in ionic liquid extraction system using β -diketone | The purpose on this study is establishment of a separation process for rare earths. For this purpose, in ionic liquid extraction system using β -diketone (Hbfa), we focused on extraction behaviors and stability of extracted species evaluated from slope analysis, spectroscopic investigations, quantitative analysis of complex formation constant and DFT calculation. As a result, it was revealed that the extracted species of rare earths formed 1 : 3 (metal : ligands) neutral complexes, and $[\text{Dy}(\text{bfa})_3]$ was more stable than $[\text{Nd}(\text{bfa})_3]$ from the complex formation constant. |

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| Xia XU | Naoya KASAI | Research for Remote Field Eddy Current Testing Probe with Magnetic Shield | Remote Field Eddy Current Testing is selected for the quantitative evaluation about the corrosion of ferromagnetic materials. As the purpose of research, RFECT Probe with Magnetic Shield is developed for the detection of back-side flaw on flat-board steel plate. According to the amplitude and phase of the detecting signal, the probe's detectability can be evaluated. |
| Mengmei LIU | Michiko KUMASAKI | Classification of Mitigation measures based on accident and its validation | Mitigation means reduction of the effects of an accident or a disaster ,which is used during or immediately following an accident or a disaster. This paper discussed classification of mitigation. In this study, the data of accident and disaster cases were analyzed using Grounded theory approach. The classification was made based on 18600 cases. Three cases which happened in China were studied.Mitigation scheme for accident was proposed according to this classification.Mitigation implemented by China authorities was compared to the classification and its validation was discussed.This classification is expected to help us to methodically select the mitigation method and to make appropriate plans. |
| Dan CHEN | Mieko KUMASAKI | A Proposal of Thermal Hazard Analysis Method for Enzymatic Process | Enzymatic reactions are generally operated under mild and aqueous conditions, which is amenable to the concept of green chemistry. There has been very little concern about the thermal risk of runaway reaction in enzymatic process, because heat accumulation inactivates enzymes and slows down the reaction rates. However, the thermal risk of enzymatic process with the presence of thermally unstable materials is not yet disclosed. This study investigated the thermal risk of enzymatic processes with the presence of thermally unstable materials and proposed a thermal hazard analysis method for enzymatic process. |