

List of Dissertation Abstract (Environment and Natural Sciences Life Sciences Course)

Name	Supervisor	Title	Abstract
Saki ITO	Kazuyuki HIRATSUKA	Construction of a novel reporter gene assay system using a selective inhibitor of luciferase activity	In this study, we found several compounds that show selective inhibitory activity depending on the type of luciferase protein. Using this compound, we constructed a novel dual-luciferase reporter assay system. In this system, the separation of the two kinds of luciferase activities can be carried out regardless of the emission wavelength. This novel assay system enables us to conduct a multi-luciferase reporter assay applicable to high-performance system with wide variety of bioluminescence reporter genes.
Kei Ogura	Yukio YOKOYAMA	Applicability of low-capacity cation-exchange chromatography to LC-MS	I evaluated for diversity and optimum conditions of amino acid separation, Low-capacity cation-exchange column co-developed, and found the conditions on which 26 species could be separated and proteinogenic amino acids could be completely separated. Also, I have found the separation conditions of the protein constituent amino acids using formic acid system, which is volatile, instead of traditional non-volatile phosphoric acid to combine the low exchange capacity cation exchange chromatography and mass spectrometry.
Kouhei OBASE	Takashi AMEMIYA	The creation of toxicity evaluation concept using the glycolytic synchronization phenomenon of micro-encapsulated yeast cell population	Yeast is a model organism of eukaryote, by encapsulating in microcapsules, to set the cell density in the capsule, was successfully control the synchronization of yeast glycolysis oscillating reaction. Yeast degree of synchronization which is densely fixing is high, the degree of synchronization which is fixed to a low density with respect to a low yeast, influence on the vibration response of the chitosan is a toxic substance is lower about 40% - 50% it was found. Thus, when cells are present at high density, it was able to offer the possibility to have a resistance to toxicity.

<p>Nao KAJIMOTO</p>	<p>Kiyoshi HONDA</p>	<p>Skeleton Transformation via Diels-Alder Cycloaddition of Isoindoles and Maleimide</p>	<p>Treatment of Diels-Alder adducts with oxidants resulted in the formation of amine oxides to give Meisenheimer rearrangement products, followed by skeleton transformation reaction to afford various nitrones and hydroxylamines as bioactive compounds.</p>
<p>Wakana KARIYA</p>	<p>Hiroyuki OTANI</p>	<p>Synthesis, Structure and Morphological alterations of π- Expanded Cyclic Oligo-3,4- diphenylthiophene 6-mer</p>	<p>Multifunctional p-expanded macrocyclic oligothiophene 6-mer is a molecule having interesting structure, unique optical behavior, and polymorphism. Therefore I have synthesized p-expanded macrocyclic oligo-3,4-diphenylthiophene 6-mer 6T4A-Ph using modified McMurry coupling reaction of dialdehyde precursor. The molecular structure of 6T4A-Ph was examined by the X-ray crystal structural analysis. The optical properties of 6T4A-Ph were characterized by the absorption and fluorescence spectra in solution and in the solid state. Furthermore, I discussed about the properties of the 34p-dication 6T4A-Ph₂⁺ which was prepared by chemical oxidation of 6T4A-Ph with Fe(ClO₄)₃ · 6H₂O. Morphological changes of 6T4A-Ph by the difference of recrystallization solvent were observed in the absorption and fluorescence spectra.</p>

<p>Shoh KAWANO</p>	<p>Kiminori ITOH</p>	<p>Statistical analysis of the climate effects of magnetic and radiation variations of solar activity</p>	<p>The cause of climate is not only anthropogenic factor, such as an increase in carbon dioxide. The influences of various anthropogenic and natural forces should be taken into account. I examined the influence of the solar wind on the climate using the correlation maps between the solar wind activity vs. temperature data.</p> <p>As a result I found that the magnitude of the influence of the solar wind on the climate compare well with that of the teleconnection patterns such as the AO and PDO. And the solar wind appears to excite the teleconnection patterns to affect the surface temperature.</p>
<p>Chiharu KIKITSU</p>	<p>Yukio YOKOYAMA</p>	<p>Preparation of high-selectivity low-capacity cation exchange column for Amino acid</p>	<p>A novel poly-functional low-capacity cation-exchange packing material was developed for the fast amino-acid separation. The amino acid selectivity arised from the versatile interaction to sulfo- and calboxy-functional groups on the PS-DVB resin, introduced by Friedel-Crafts reaction, which was successfully controlled by the concentrations of acylating reagent and Lewis acid. Seventeen underivatized proteinogenic amino acids were separated in 18 min with a binary gradient elution system using a conventional HPLC.</p>

<p>Ryuta KIRA</p>	<p>Hiroyuki Otani</p>	<p>Synthesis, Properties, and Photovoltaic Characteristics of the D-π-A Type Troponoid Dyes Containing Thiophene Ring</p>	<p>The troponoid molecules such as tropolone and related 2-substituted tropones are the typical examples of non-benzenoid compounds which possess pronounced aromatic character. Therefore I have designed and synthesized eight kinds of novel D-π-A type troponoid dye containing thiophene ring as spacer. I have investigated the molecular structures, the absorption behavior, and the redox properties of these dyes. In addition, these dyes have been investigated the photovoltaic characteristics for dye-sensitized solar cells. Furthermore, the dye-sensitized solar cell device sensitized with the dyes has been fabricated and measured. All of D-π-A type troponoid dyes containing thiophene ring as spacer showed photovoltaic characteristics.</p>
<p>Takuma SAKATA</p>	<p>Shinya MATSUMOTO</p>	<p>Crystal structures and solid-state optical properties of 2,5-diamino- 3,6-dicyaopyrazine dyes with small alkyl substituents on the amino groups</p>	<p>Solid-state optical properties of 2,5-diamino-3,6-dicyaopyrazine dyes with small alkyl substituents on the amino groups were interpreted by quantum chemical calculations on the basis of the X-ray structure data. These five derivatives had almost similar electronic structures in a molecular state. In the solid states, on the other hand, significant difference was found in their optical properties. According to the results of semi-empirical molecular orbital calculations using the X-ray structure data, the conformations of the amino groups in the molecule may play a critical role in the solid-state optical characteristics of these derivatives.</p>

<p>Takuya SAKATA</p>	<p>Kazuyuki HIRATSUKA</p>	<p>Study on development of a high-throughput system for Agro-infiltration method</p>	<p>In this study, I investigated the use of the high-throughput system of the Agro-infiltration method using a multi-well plate and examined various conditions to optimize the transgene expression. Unlike the conventional method that requires needleless syringes and fully developed mature leaves for the transient assay, this method allows infiltration of multiple Agrobacterium samples into small tobacco seedlings simultaneously. Also, in this system, the use of a multi-well plate and bioluminescence reporters enable us to conduct rapid and accurate evaluation of gene expression in planta with only a limited space.</p>
<p>Yosuke SHIGEMATSU</p>	<p>Kiyoshi HONDA</p>	<p>Novel synthesis of 2H-chromenes by cycloaddition reaction with alkynes and ortho-quinonemethide</p>	<p>2H-Chromenes are present in a vast number of natural products and important heterocyclic compounds appeared in anticancer and antioxidant drugs. Especially, 2,3-diaryl-2H-1-benzopyran derivatives are received significant attention as selective estrogen receptor adjustment medicines in late years. Most efficient preparation of 2H-chromenes is an important issue in organic synthesis. In this article, a novel synthesis of various substituted chromenes from easily available various 5-substituted salicylaldehydes and diphenylacetylenes is described.</p>

Yosuke SHIMODAIRA	Hiroyuki OTANI	Synthesis and properties of 5-(4-sulphophenyl)heptalate and its analogue	Sulphophenyl carboxylates (SPCs) are known as the biodegradation of Linear alkylbenzene sulfonate (LAS) widely used as anionic surfactants in a variety of industrial and commercial products. It is reported that the toxicity for the submarine life of LAS is related to the surface tension. Therefore, I have designed and synthesized 5-(4-sulphophenyl)heptalate (5C7SPC) and 11-(4-sulphophenyl)tridecalate (11C13SPC) as a single SPC. 3-Phenylpentanol, as those common precursor, has been synthesized of propiophenone with phosphate ylide. Single 5C7SPC has been synthesized by using the Wittig-Horner reaction, and single 11C13SPC has been synthesized by using the Wittig reaction as the key step. The structure of 5C7SPC or 11C13SPC has been examined by FT-IR and ¹ H-NMR spectrum.
Atsumi SHIRAI	Hiroyuki OTANI	Synthesis, and Properties of 1,8-Diphenyl-10-mesitylanthracene Cyclic Dimer and its Complexation Behavior	1,8-Diphenyl-10-mesitylanthracene cyclic dimer with a rigid and symmetrical π -conjugated system is expected that two biphenylene chains located face-to-face indicate a weak π - π interaction. Herein, the synthesis, structure, optical properties, and complexation behavior of this dimer were investigated. The title cyclic dimer was synthesized by using the electron-transfer oxidation of Lipshutz cuprate derived from 10-mesityl-1,8-bis(4-bromophenyl)anthracene. This dimer is a considerably fluorescent, stable molecule. This dimer like [5,5]paracyclophane forms CT-complex with strong electronic acceptor molecule such as DDQ. The X-ray analysis revealed a unique structure with a small inner cavity which can incorporate a small atom such as Cu ⁺ . So, I discussed them complexation behavior.
Hiroaki SUZUKI	Kazuyuki HIRATSUKA	Identification and Characterization of a Small Molecule that Induce Pathogenesis-responsive Gene Arabidopsis BIK1	A plant defense gene botrytis-induced kinase1 (BIK1) gene is transcriptionally regulated in response to disease stresses. However, very little is currently known about the expression mechanisms. To find chemicals which induce BIK1 gene promoter expression, we developed a high throughput screening (HTS) system based on bioluminescence reporter gene technology. In this study, I characterized the compound X that acts BIK1 gene promoter. Using our HTS system, I investigated expression patterns of BIK1 gene promoter in response to treatments of compound X. Also, I examined possible chemical priming effect of the compound X on plant defense gene expressions.

Ryuta SEIKE	Kiminori ITOH	Evaluation of the physical properties Ligand change method and Green chemical method of metal organic decomposition method	The silver nanoparticles currently active in various fields have been expected, the ligand-change method is a new synthetic methods, and synthesis was performed using a green chemical method. In addition, we thermal properties evaluation using a TG / DTA, structural and physical properties of a transmission electron microscope, the optical property evaluation of using a spectrophotometer. Due to the difference of the various physical properties in the difference of the protective group in which the mention of the new findings, such as changes in the changes and the crystal structure of the grain size occurs went.
Shunsuke TAKUMA	Kiyoshi HONDA	Stereoselective synthesis of 1,1'-disubstituted-2,2'-spirobiindane	Spirans are rigid framework, which minimizes the number of possible conformations and consequently benefits in selectivity. Moreover, it is possible to have C ₂ symmetry in spiro ring system, so it is expected to give high enantioselectivity. In this work, I had focused on 2,2'-spirobiindane core, and synthesized 1,1'-disubstituted compounds through stereoselective functionalization of carbonyls in 2,2'-spirobiindane-1,1'-dione.
Chihiro TSURU	Kazuyuki HIRATSUKA	Construction of multi-gene expression system using several 5' untranslated regions of viruses	For high-efficiency production of recombinant proteins in plants, we have developed multigene expression systems using IRES (Internal Ribosome Entry Site). Using transient expression assay, we confirmed several 5' UTRs (untranslated regions) of viruses are able to increase the IRES-dependent translation activity. I investigated whether they show similar activity in transgenic BY-2 cells in this study. Results of bioluminescence monitoring of luciferase reporter genes indicate that some 5'UTRs were able to improve bicistronic translation activity in the stable transformants.
Daisuke NOMURA	Yukio YOKOYAMA	Effects of physics of low-capacity cation-exchange materials on amino acid selectivity	Using commercial amino acids analyzer is the most popular method of amino acids analysis, and proteinogenic amino acids are separated for an hour. In this study, I have made a study of effects of physics of low-capacity cation-exchange materials on amino acid selectivity. As a result, 7 nm pore-size base-gel has highly selectivity for amino acids and it was found that it is suitable separating material for amino acids.
Shun HIRAOKA	Kiyoshi HONDA	Asymmetric epoxidation of substituted o-allylphenols catalyzed by Ti-CHA and its application to a divergent synthetic study of chiral chromanes and coumarans	A lot of optically active chromans and coumarans derived from plants and microbes are known to have intriguing bioactivities. In this work, we investigated asymmetric epoxidation of substituted o-allylphenols using Ti catalyst with cyclic hydroxamic acid ligands and its application to a divergent synthetic study of chiral chromanes and coumarans.

Naoki HIRAMATSU	Takashi AMEMIYA	Quantitative analysis of glycolytic synchronization phenomena in yeast cell population	Yeast is a eukaryotic cell. Then, show a common life phenomena with human. Therefore, it can be used as a model cell. Study of glycolysis which is one of the important biological phenomena for animate beings is performed using the model cell. Glycolytic oscillations in yeast cells show a sharp reaction to an external stimulus. Glycolytic oscillation observed in each cell is synchronized with the reagent. It succeeded in synchronizing with newly ethanol and ATP other than acetaldehyde known to be the synchronization action.
Tetsuya HIROTA	Takashi AMEMIYA	photochemical synthesis of gold nanoparticles with recycling the reducing agents	We aimed at the proposal of the new concept of " synthesis of gold nanoparticles with recycling the reducing agents " using both formation of gold nanoparticles using hydroquinone (HQ) and an optical reduction reaction of benzoquinone (BQ). It is expected to reduce consumption of the reducing agent and Emissions of by-product in the liquid phase reduction method for synthesizing gold nanoparticles. As a result, our study provides a simple method to synthesize size-controlled gold nanoparticles using HQ as a reducing agent. Also, we indicated the gold nanoparticle formation using a photochemical reaction of BQ for the first time.
Ryo MIYAKE	Kiminori ITOH	Adsorption properties evaluation of the lichen to Sr and Cs	Lichen is known to accumulate radioactive material in the body. In addition, a lot of examples that radioactive material is detected under the influence of Fukushima nuclear plant accident excessively in Japan are reported. Therefore I thought lichen to have possibilities to be available as adsorption materials for the radioactive material, and I started a study. At first elucidating adsorption properties and mechanism of the still indistinct lichen, and examining the application to adsorption materials of the study was intended.