Our major interests are synthetic organic chemistry, especially in the development of new synthetic organic reactions and materials using characteristics of heteroatoms and/or photochemistry. Our recent research topics are listed below.

1. Synthesis of novel heterocyclic compounds utilizing multiple bonds containing chalcogen elements
2. Construction of multi-functionalized molecules using transition-metal catalysts and heavy heteroatoms
3. Development of highly efficient and selective new photochemical reactions
4. Development of functionalized fluorescent materials based on pyrene derivatives
5. Development of novel optical materials based on azaporphyrinoids

Master/Doctor course: Education policy, curriculum, typical activity in the laboratory

In undergraduate students, you should train to master fundamental experimental technique, knowledge about safety, quantitative mentality, reading ability of literature, document retrieval, and English ability. Although we recommend you to study organic synthesis in undergraduate, you can join from the other fields with your high motivation on organic chemistry. In master and doctor courses, you follow each professor in our group and should attend group meetings and/or discussions. Meetings of reading textbooks and introduction of journal articles will be held once a week, respectively. Meetings of research seminar will be held 3-4 times in a year. After attendance at academic conferences, attendance report will be presented. Special lectures by the professors from the other institute will also be held randomly. Students attend domestic/international conferences to have a presentation of their research results. Finally, we will submit papers to international journals.

Daily life in the laboratory, etc.

Independent laboratory table and a desk are provided to each student. In the laboratory, students carry out not only organic synthetic experiments, but also analysis of physical properties, theoretical calculations, retrieve literature, making slides or papers for conferences, attending the classes, and discuss the results with professors and senior students. Since students should have many tasks, we recommend students strongly to work intensively from 9:00 am to late night. For the safety’s reason, the experiments should be carried out without alone. In the seminars, students should have questions and comments for the other presentation.

Message or comments by the laboratory faculty staffs

It is interesting that research results include individual personality and originality. Experimental results are often anticipated, but unexpected results are sometimes obtained. When students meet such serendipity, it causes opportunity to be deeply fascinated by chemical research. To find serendipitous novel results, students need deep knowledge in the wide and various fields. We want to tell students an importance of a wide range of vision, a pleasure of research and creativity of solutions toward difficulties in future through the research activity. Please come to our laboratory if you are interested in organic chemistry, medicinal chemistry, and photochemistry. Many students will find work in future in chemical industry or pharmaceutical companies. Lab’s recreational trip, beer party, softball/badminton day (including beer party), will be held at any time and you may attend them to spend comfortable days.

Recent Master theses in these 3 years (+ more if appropriate)

<table>
<thead>
<tr>
<th>year.month</th>
<th>Thesis title (including English translation of Japanese thesis title)</th>
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<tbody>
<tr>
<td>2019.3</td>
<td>Photo–Fries rearrangement reactions of phenanthryl esters</td>
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<tr>
<td>2019.3</td>
<td>Development of functionalized near–IR absorbing phthalocyanines by three–component coupling strategy</td>
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<tr>
<td>2019.3</td>
<td>Development of intramolecular photocycloaddition reactions of alkenes to 1,8a–position of naphthalene ring</td>
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<tr>
<td>2019.3</td>
<td>Synthesis of Selenosugar Derivatives Having Heteroatom Functional Groups via Cycloaddition Reaction of Selenoaldehydes</td>
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<td>2019.3</td>
<td>Synthesis of bay–annulated indigo derivatites and investigation of their peripheral substituent effects</td>
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<tr>
<td>2019.3</td>
<td>Synthesis and properties of azaporphyrins bearing AIE active moieties</td>
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<tr>
<td>2019.3</td>
<td>Synthesis, fluorescence and molecular recognition of (2,7)pyrenophanes tethered by methylene chains</td>
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<tr>
<td>2018.3</td>
<td>Synthesis and Fluorescence Proerties of (1,6)Pyrenophanes Linked by Oligoethylene Glycol Tethers</td>
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<tr>
<td>2018.3</td>
<td>Development of luminescent materials using dicyano compounds as strong acceptors</td>
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<tr>
<td>2018.3</td>
<td>Intramolecular and Intermolecular Photodimerization Reactions of 3–(Pyren–1–yl)acrylates</td>
</tr>
<tr>
<td>2018.3</td>
<td>Synthesis and Reactions of Nitrogen Ylides Substituted with a Selenocarbonyl Group</td>
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Creation of various functions by the synthesis of electron acceptor substituted phthalocyanines using lead ion

Synthesis of Chiral Bidentate Ligands Containing Phosphorus–Chalcogen Bond

Synthesis of Selenosugar Derivatives via Cycloaddition Reaction of Selenoaldehydes

Aromatic Rearrangement Reaction of Aryl Naphthylmethyl Ethers by Using Lewis Acids

Structures and Fluorescence Properties of Stilbene Derivatives Containing Silyl Groups

Effect of Substituents on Pyrene Ring upon Absorption and Fluorescence Properties of Silylethynylpyrenes

Structures and Fluorescence Properties of (1,8)Pyrenophanes

Inhibition of Fluorescence Quenching Process of Pyrene Core by Bulky Substituents

Synthesis and Fluorescence Properties of (1,3)Pyrenophanes Containing Crown Ether Moieties

Synthesis and Reaction of Pyridinium Ylides Substituted with a Selenocarbonyl Group

One–Pot Synthesis of Selenium–Containing Heterocyclic Compounds by Selenation of Isocyanates Followed by Reaction with Propargyl Amines and Alcoholates

Synthesis of Heterocyclic Compounds Having Vinyl Substituents Using Phenyl Homopropargyl Selenide

Synthesis of Non-Natural Selenonucleosides Utilizing Cycloaddition of Selenoaldehydes and Stereospecific Ring Contraction

Effects of Substituents on Silicon upon Absorption and Fluorescence Properties of Silylpyrenes

Development of Metal Ion Responsible Fluorescence Sensors Based on Benzocrown Ether–Ethynylpyrene Linked Molecules

Design and Synthesis of Bis(pyrenylethynyl) Compounds Which Exhibit Intense Intramolecular Excimer Emissions

Absorption and Fluorescence Properties and Photoreactivity of 2–(Benzylxoymethyl)naphthalenes

Synthesis of Selenosugar–Related Compounds Utilizing Cycloaddition Reaction of Selenoaldehydes with Danishefsky Diene

Reaction of [4+2]Cycloadducts between Selenocarbonyl Compounds and Cyclopentadiene with Organolithium Reagents

Synthesis and Conformations of 2,11–Dioxo[3.3.]metacyclophanes

Three–Components Coupling Reaction of Active Methylene Compounds, Dienes, and Electron–Deficient Alkenes via Photoinduced Electron Transfer

Synthesis of Pyrenocrown Ethers and Their Recognition Ability for Metal Ions

Development of Selective Modification of 4,5–Positions of Pyrene Using Photocycloadducts between Pyrene and Alkenes

Synthesis of Chiral Bidentate Ligands Having Sulfur, Selenium, and Phosphorus by Using Prolinol as an Asymmetric Source

[3+2]Cycloaddition of Selenoaldehydes with Nitrile Ylides

Synthesis of Alkenes and Isocyanides Utilizing Selenation Reaction of Carbonyl Group Followed by Deselenlation

Synthesis and Reactions of Pyridinium N–Monosubstituted Selenocarbamoymethylide Derivatives

Photocycloaddition of Cyanonaphthalenes with Aromatic Alkynes

Effects of Substituents on Silicon upon Absorption and Fluorescence Properties of Tetrakis(silylethynyl)pyrene Derivatives

Synthetic Transformations Based on Cooperativity of Phenylseleno Group and Transition–Metal Reagents

Synthetic Transformations Based on Cooperativity of Phenylseleno Group and Transition–Metal Reagents

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