

Department of Chemical Bioscience

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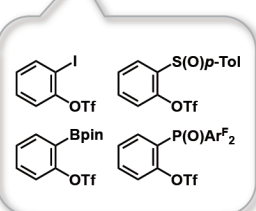
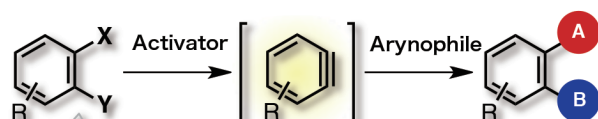
New chemistry for life sciences

1. Development of novel generation methods for benzyne species and their synthetic applications
2. Development of new methods for chemical modification of biomolecules by strained alkynes
3. Development of new methods for target identification of bioactive compounds by photoaffinity labeling based on azide chemistry
4. Development of efficient methods for connecting multiple molecules based on the characteristic features of azido groups
5. Design and synthesis of efficient substrates for bioluminescence reactions, and fluorescent probes for bioimaging and diagnosis of diseases
6. Development of PET (positron emission tomography) probe candidates for *in vivo* imaging to promote drug discovery

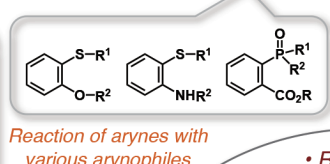
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2. Yoshida S, Shimizu K, Uchida K, Hazama Y, Igawa K, Tomooka K, Hosoya T: Construction of condensed polycyclic aromatic frameworks through intramolecular cycloaddition reactions involving arynes bearing an internal alkyne moiety, *Chem Eur J*, 23, 15332-15335, 2017.
3. Sakaguchi H, Uetake Y, Ohashi M, Niwa T, Ogoshi S, Hosoya T: Copper-catalyzed regioselective monofluoroborylation of polyfluoroalkenes en route to diverse fluoroalkenes, *J Am Chem Soc*, 139, 12855-12862, 2017.
4. Kanemoto K, Sugimura Y, Shimizu S, Yoshida S, Hosoya T: Convergent synthesis of trifunctional molecules by three sequential azido-type-selective cycloadditions, *Chem Commun*, 53, 10640-10643, 2017.
5. Nishiyama Y, Hazama Y, Yoshida S, Hosoya T: Synthesis of unsymmetrical tertiary phosphine oxides via sequential substitution reaction of phosphonic acid dithioesters with Grignard reagents, *Org Lett*, 19, 3899-3902, 2017.

We aim to develop molecular probes and methodologies that can be used to elucidate and regulate biological phenomena, based on synthetic organic chemistry. In particular, we are focusing on the synthesis of functional compounds based on developing new reactions using highly distorted molecules, and developing molecular imaging probes that can be used *in vivo*.

Aryne chemistry

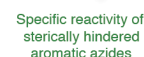
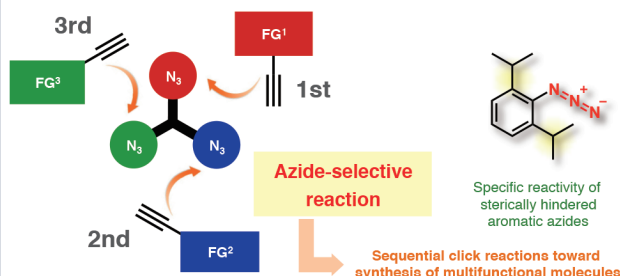


Aryne precursors
with various heteroatoms



Reaction of arynes with
various arynophiles

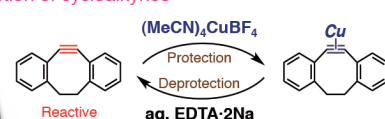
Click chemistry



Specific reactivity of
sterically hindered
aromatic azides

Sequential click reactions toward
synthesis of multifunctional molecules

Protection of cycloalkynes



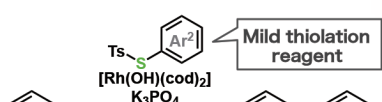
Reactive

Organic
chemistry

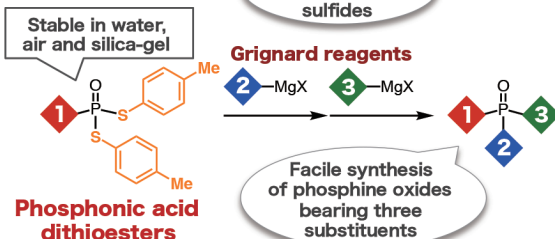
Chemical
biology

• Reactions
• Reagents
• Methods

• Targets
• Tasks



Synthesis of
diverse diaryl
sulfides



Phosphonic acid
dithioesters

Facile synthesis
of phosphine oxides
bearing three
substituents

Stable in water,
air and silica-gel

Grignard reagents

New synthetic methods

Development of bioactive molecules

