ORGANIC SEMINAR

Harnessing Halogens in Photochemical Transformations

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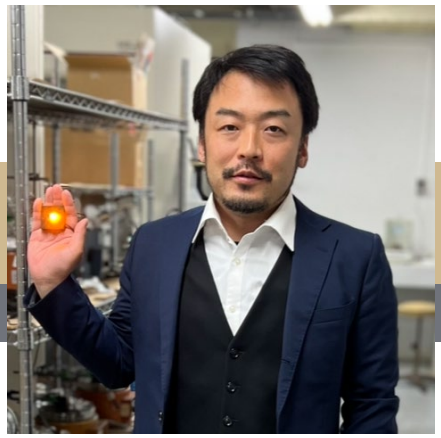

Photochemical transformations have recently gained attention as innovative tools in modern organic synthesis. By harnessing the energy of light, it becomes possible to transiently generate high-energy intermediates—such as radical or ionic species—that are otherwise difficult to access under thermal conditions, thereby enabling unprecedented reactivities and bond transformations.

In my research, I have focused on the development of novel photochemical reactions involving halogens. My studies have revealed that halogen atoms and halogen-containing compounds can act not merely as leaving groups, but also as active regulators of photochemical processes.

Furthermore, by leveraging halogen bonding— a relatively weak noncovalent interaction— we have established a new strategy for the selective photochemical activation of C–X bonds (X = Cl, Br, I).

This approach allows precise modulation of the substrate's electronic properties through halogen bond-mediated interactions with suitable acceptors, enabling the direct activation of inert bonds under visible-light irradiation.

By integrating the unique electronic characteristics of halogens with photochemical reactivity, this strategy provides a new paradigm for selective bond cleavage and skeletal rearrangements under mild conditions. In this presentation, I will also highlight our recent advances in this area, with particular emphasis on the electronic and spatial roles of halogens in guiding photochemical reactivity, along with mechanistic insights obtained through computational studies.

Friday, August 22, 2025 | **3:30 pm** | **BRWN 4102**

PURDUE UNIVERSITY

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