

화학과 세미나

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Radical Logic in Organic Chemistry: From Reaction Development to Medicinal Applications

Modern organic methodologies, such as photoinduced late-stage functionalization and skeletal editing, have gained significant attention due to their pharmaceutical potential and versatility. In this presentation, I will introduce the ideas behind the development of new organic reactions using radicals, along with the applications that have been explored from these concepts. The first part of the talk will focus on the journey of developing selective pyridine C–H functionalization reactions using pyridinium salts under visible light excitation. The designed N-activator induces excellent positional selectivity within the pyridine ring and highlights the mechanisms that generate useful radical intermediates through synergy with various radical precursors. Next, I will present a new strategy that enables cysteine-specific bioconjugation of large biomolecules, such as proteins, by designing a novel water-compatible reagent. This approach, which utilizes a HAT (hydrogen atom transfer) mechanism rather than a redox process, demonstrates exceptional cysteine selectivity. Finally, I will discuss the development of a method for direct synthesis of primary sulfonamides from primary amines using a combination of anomeric amide and SO₂ sources via radical pathways. The anomeric amide reagent not only facilitates the cleavage of C–NH₂ bonds but also serves as a new nitrogen source. Using this newly developed reaction, a library of over 80 pharmaceutically relevant amine compounds was screened, and high-throughput experiments were conducted to explore the scalability of the library.

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