

EXPLORING RING TRANSFORMATION: OPENING, FORMATION, AND SWAPPING OF CYCLIC STRUCTURES

Junichiro Yamaguchi

Department of Applied Chemistry, Waseda University

Tokyo, 162-0041, Japan

junyamaguchi@waseda.jp

Cyclic structures—ranging from all-carbon rings such as benzene to nitrogen- and oxygen-containing heterocycles—are ubiquitous in organic molecules and play decisive roles in determining their physical, chemical, and biological properties. Their importance continues to drive the development of new strategies for cyclic framework manipulation.

This talk highlights three transformations that dramatically remodel cyclic skeletons. A ring-opening strategy for cyclic amines is achieved under blue-light irradiation in the presence of a Lewis acid and a photoredox catalyst, enabling selective C–C bond cleavage via carbon radical intermediates under mild conditions. A complementary ring-formation approach relies on the in situ generation of highly reactive ortho-quinodimethane intermediates through a simple multicomponent process, providing an efficient and modular route to polycyclic structures. Finally, a heteroaromatic swapping reaction is described, in which aromatic ketones are converted into heteroaromatic frameworks through a Claisen/retro-Claisen pathway, offering a practical method for selective aromatic editing.

