Molecular recognition underlies essentially every aspect of biology and selective inhibition of culprit molecules has been the guiding philosophy of medicinal chemistry. In nature, selective association of molecules are primarily driven by noncovalent interactions, while covalent bond formation has been largely avoided due to the potential difficulty of dissociation. We and others have been developing reversible covalent chemistries, which can give rise to powerful strategies for targeting biomolecules. Specifically, we have been investigating the iminoboronate chemistry with the goal of targeting biological amines. In contrast to imines (Schiff bases), which typically do not form in water, iminoboronates exhibit much improved thermodynamic stability, making it suitable for biological applications. In this seminar, I will present detailed characterizations of the dynamic iminoboronte formation under physiologic conditions. Biological applications of the iminoboronate chemistry have been explored in our laboratory in the context of antibiotics development. Specifically, we have reported the iminoboronate-enabled peptide bicyclization, as well as the covalent modification of Lys-PG, a bacterial lipid responsible for resistance to cationic antibiotics. The details of these developments will be discussed as well.

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References