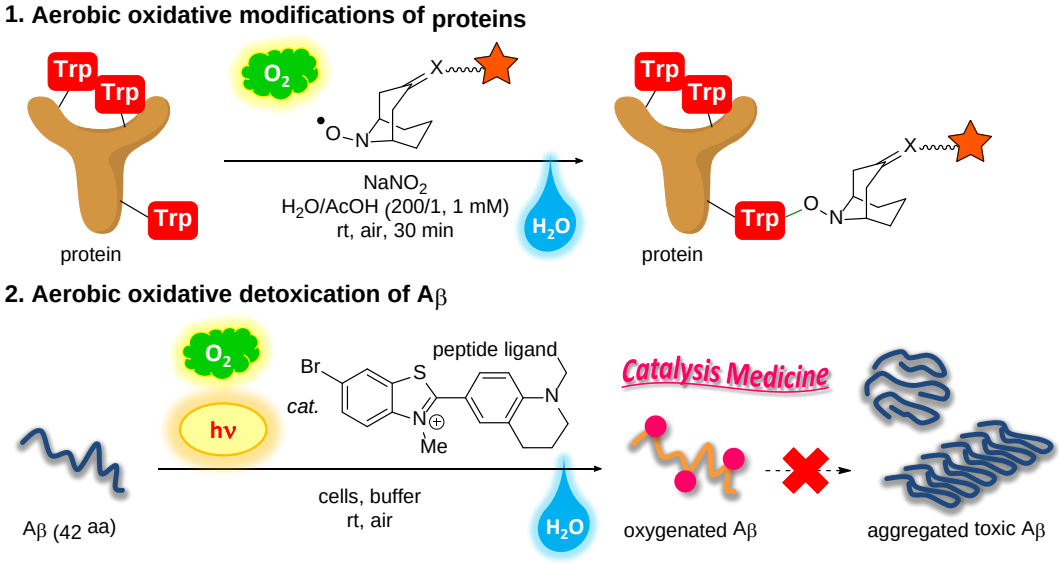
Aerobic Oxygen-Driven Functionalization of Proteins

Motomu Kanai

Graduate School of Pharmaceutical Sciences, The University of Tokyo
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan
E-Mail : kanai@mol.f.u-tokyo.ac.jp

Our long-term research goal is developing synthetic catalysts that surrogate enzymes, and using the synthetic catalysis in our body as a new paradigm of medicine (catalysis medicine). Such a research direction should in turn contribute to green synthesis of functional molecules, including drugs. To do so requires powerful catalysts, which can functionalize stable, multifunctional organic molecules, ranging from small molecules to biomacromolecules, under mild conditions with synthetically valuable selectivity. Our catalysts (or reagents) rely on the environmental energy sources, i.e., aerobic oxygen (and light), to gain the reactivity. I will present a tryptophan-selective protein functionalization[1] and catalytic detoxication of amyloid β (Aβ).[2] In both reactions, aerobic oxygen acts as a key driver. These two oxidative reactions may be useful for generating high-quality antibody–drug conjugates and treating Alzheimer disease, respectively.



[1] Seki, Y.; Ishiyama, T.; Sasaki, D.; Abe, J.; Sohma, Y.; Oisaki, K.; Kanai, M. *J. Am. Chem. Soc.* **2016**, *138*, 10798–10801.
[2] (a) Taniguchi, A.; Sasaki, D.; Shiohara, A.; Iwatsubo, T.; Tomita, T.; Sohma, Y.; Kanai, M. *Angew. Chem. Int. Ed.* **2014**, *53*, 1382–1385. (b) Taniguchi, A.; Shimizu, Y.; Oisaki, K.; Sohma, Y.; Kanai, M. *Nat. Chem.* **2016**, 8, 974–982.