



UNIVERSITÀ
DEGLI STUDI
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DICUS

DIPARTIMENTO DI CHIMICA
"UGO SCHIFF"

ECCELLENZA 2023-2027



UNIVERSITÀ
DEGLI STUDI
FIRENZE

PhD
Chemical Sciences

Da un secolo, oltre.

PROF. DR. YUKI GOTO

PROFESSOR IN CHEMICAL BIOLOGY

**DEPARTMENT OF CHEMISTRY
GRADUATE SCHOOL OF SCIENCE
KYOTO UNIVERSITY**

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Tuesday July 8, 2025

15:00

Aula 16

Blocco Aule - Campus Sesto Fiorentino

Via Bernardini 6, 50019 Sesto Fiorentino (Firenze)

Link for online connection

meet.google.com/epm-jaep-wuf

will present the lecture

**Architecting pseudo-natural peptides
by in vitro artificial biosynthesis
Organised in the context of the
PhD Programme in Chemical Sciences**

You are kindly invited to participate

Prof. Dr. Anna Maria Papini
Coordinator of the PhD
in Chemical Sciences

Prof. Dr. Anna Maria Papini
Organizer

Yuki Goto, Professor in Chemical Biology

Department of Chemistry, Graduate School of Science,
Kyoto University



Yuki Goto received his M.S. from Kyoto University in 2005, where he studied nucleic acid chemistry under the supervision of Professors K. Nakatani and I. Saito. He then joined the group of Professor H. Suga at the University of Tokyo, earning his Ph.D. in 2008 with research focused on reprogramming of translation systems. From 2008 to 2009, he conducted postdoctoral research at the University of Illinois at Urbana-Champaign with Professor W. A. van der Donk, working on the biosynthesis of lanthipeptides. In 2009, he was appointed as an assistant professor at the University of Tokyo and promoted to associate professor in 2016. During this period, he was engaged in the mRNA display-based development of cyclic peptide ligands and, in parallel, initiated his independent research on the artificial biosynthesis of pseudo-natural peptides. In 2024, he moved to Kyoto University as a full professor. His current research interests include the development of artificial in vitro biosynthesis systems and their application to the discovery of pseudo-natural products with novel bioactivities.

Selected recent papers

- 1) Inoue S.; Thanh Nguyen D.; Hamada K.; Okuma R.; Okada C.; Okada M.; Abe I.; Sengoku T.; Goto Y.; Suga H. *Angew. Chem. Int. Ed.*, **2024**, 63, e202409973.
- 2) Chang, J.S.; Vinogradov, A. A.; Zhang, Y.; Goto, Y.; Suga, H. *ACS Cent. Sci.*, **2023**, 9, 2150–2160.
- 3) Zhang, Y.; Hamada, K.; Nguyen, D. T.; Inoue, S.; Satake, M.; Kobayashi, S.; Okada, C.; Ogata, K.; Okada, M.; Sengoku, T.; Goto, Y.; Suga, H. *Nat. Catal.*, **2022**, 5, 682–693.
- 4) Kuroda, T.; Huang, Y.; Nishio, S.; Goto, Y.; Suga, H. *Nat. Chem.*, **2022**, 14, 1413–1420.
- 5) Vinogradov, A. A.; Zhang, Y.; Hamada, K.; Chang, J. S.; Okada, C.; Nishimura, H.; Terasaka, N.; Goto, Y.; Ogata, K.; Sengoku, T., *et al. J. Am. Chem. Soc.*, **2022**, 144, 20332–20341.
- 6) Tsutsumi, H.; Kuroda, T.; Kimura, H.; Goto, Y.; Suga, H. *Nat. Commun.*, **2021**, 12, 696.
- 7) Goto, Y.; Suga, H. *Acc. Chem. Res.*, **2021**, 54, 3604–3617.

Positions since final degree

2008-2009	Postdoctoral research associate, University of Illinois at Urbana-Champaign Advisor: Prof. Wilfred A. van der Donk Project: Discovery and mechanistic studies of a novel class of lantibiotic synthetase
2009-2010	Assistant Professor, Research Center for Advanced Science and Technology, The University of Tokyo
2010-2016	Assistant Professor, Department of Chemistry, The University of Tokyo
2011-2015	Investigator, PRESTO research program, Japan Science and Technology Agency
2016-2023	Associate Professor, Department of Chemistry, The University of Tokyo
2024-	Professor, Department of Chemistry, Kyoto University
2024-	Toyota Riken Rising Fellow, Toyota Physical and Chemical Research Institute

Architecting pseudo-natural peptides by in vitro artificial biosynthesis

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Bioactive peptidic natural products often have unique non-proteinogenic structures, which are generally essential in their potent bioactivities. In the biosynthetic pathways of ribosomally synthesized and post-translationally modified peptides (RiPPs), the non-proteinogenic structures are generated by enzymatic structural modification on precursor peptides encoded in genetic information.

We have previously devised in vitro engineered biosynthesis systems for artificial RiPP analogs by combining a custom-made cell-free translation (Flexible In-vitro Translation; FIT) system with various RiPP modifying enzymes. In these systems, so-called FIT-RiPP, precursor peptides are expressed from synthetic DNA templates, and subsequently undergo posttranslational modifications by recombinant RiPP enzymes in a one-pot manner, allowing for high-throughput production of a variety of artificial RiPP analogs. One advantage of the FIT-RiPP strategy is its amenability to genetic code reprogramming, making it possible to yield RiPP analogs with multiple non-canonical amino acid residues. Another potential use of the FIT-RiPP system is an integration with in vitro display technology, enabling us to select artificial peptide ligands against protein targets of interest. In the present talk, we will discuss the latest advances in the FIT-RiPP strategy for the development of pseudo-natural RiPPs.

