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Research Keywords

Nucleic acids chemistry, Organic chemistry, Chemical biology

Academic Career

B.S., 1986, Kyushu Univ.; Ph.D., 1996, Kyushu Univ. (advisor: Minoru Maeda); Postdoctoral Training, 2001-2002, National Institutes of Aging (NIA); Research Assistant, 1989-2003, Kyushu Univ.; Associate Professor, 2003-2006, Kyushu Univ.; Professor, 2006-present, Tohoku Univ.

Selected Publications

Nagasawa, R.; Onizuka, K.; Kawamura, K.; Tsuzuki, K.; Murase, H.; Komatsu, K. R.; Miyashita, E.; Saito, H.; Kondo, J.; Nagatsugi, F. Crystallographic analysis of G-clamp-RNA complex assisted by large scale RNA-binding profile. *Chemical Communications* 2025, 61 (6). DOI: 10.1039/d4cc04677c.

Soemawisastra, N.; Okamura, H.; Abdelhady, A. M.; Onizuka, K.; Ozawa, M.; Nagatsugi, F. Uracil-Selective Cross-Linking in RNA and Inhibition of miRNA Function by 2-Amino-6-vinyl-7-deazapurine Deoxynucleosides. *Chembiochem* 2024, 25 (21). DOI: 10.1002/cbic.202400417.

Okamura, H.; Yao, T.; Nagatsugi, F. Reversible Control of Gene Expression by Guest-Modified Adenosines in a Cell-Free System via Host-Guest Interaction. *Journal of the American Chemical Society* 2024. DOI: 10.1021/jacs.4c04262.

Nagasawa, R.; Onizuka, K.; Komatsu, K. R.; Miyashita, E.; Murase, H.; Ojima, K.; Ishikawa, S.; Ozawa, M.; Saito, H.; Nagatsugi, F. Large-scale analysis of small molecule-RNA interactions using multiplexed RNA structure libraries. *Communications Chemistry* 2024, 7 (1). DOI: 10.1038/s42004-024-01181-8.

Chen, Y. T.; Onizuka, K.; Nagatsugi, F. Michael addition-activated alkylation of G-quadruplex DNA with methylamine-protected vinyl-quinazolinone derivatives. *Bioorganic & Medicinal Chemistry Letters* 2024, 109. DOI: 10.1016/j.bmcl.2024.129855.

Chen, Y. T.; Onizuka, K.; Hazemi, M. E.; Nagatsugi, F. Reactivity Modulation of Reactive OFF-ON Type G-Quadruplex Alkylating Agents. *Bioconjugate Chemistry* 2022, 33 (11), 2097-2102. DOI: 10.1021/acs.bioconjchem.2c00458

Onizuka, K.; Ganbold, E.; Ma, Y.; Sasaki, S.; Hazemi, M. E.; Chen, Y. T.; Sato, N.; Ozawa, M.; Nagasawa, K.; Nagatsugi, F. Selective alkylation of parallel G-quadruplex structure. *Organic & Biomolecular Chemistry* 2021, 19 (13). DOI: 10.1039/d0ob02365e.

Abdelhady, A. M.; Onizuka, K.; Ishida, K.; Yajima, S.; Mano, E.; Nagatsugi, F. Rapid Alkene-Alkene Photo-Cross-Linking on the Base-Flipping-Out Field in Duplex DNA. *J. Org. Chem.* 2022, 87, 2267–2276. DOI: 10.1021/acs.joc.1c01498.

Why My Lab?

My lab can offer...

Our laboratory is dedicated to developing innovative chemical tools for controlling and elucidating gene expression within living cells. Possessing advanced expertise in organic synthesis and nucleic acid chemistry (DNA/RNA), we specialise in the design and synthesis of functional molecules for RNA-targeted drug discovery (e.g., antisense, miRNA). In particular, we are advancing the development of site-specific chemical modification techniques for nucleic acids. Our research encompasses the creation of novel supramolecular structures, such as rotaxane-forming oligonucleotides, and the development of selective probes for higher-order structures like G-quadruplexes. We guide students through the entire process, from the design and synthesis of organic compounds to biological functional evaluation, supporting them in building internationally competitive careers.