Masayasu Kuwahara, Professor

Graduate School of Integrated Basic Sciences
Nihon University
3-25-40 Sakurajosui, Setagaya-ku,
Tokyo 156-8550, Japan
Tel & Fax: +81-3-5317-9398
Email: kuwahara.masayasu@nihon-u.ac.jp

2018–Present	Professor, Nihon University
2009–2018	Associate Professor, Gunma University
2001–2009	Assistant Professor, Gunma University
2004–2008	JST PRESTO researcher (concurrent post).
2000–2001	Postdoc. University of Virginia, USA
1999–2000	Postdoc. Okayama University
1999 PhD	Okayama University

Research Interests:

Bioorganic chemistry, Bioanalytical chemistry, Nucleic acid chemistry, Molecular evolution engineering

Selected Publications:

1. Wariishi T, Kataoka Y, Nakamura T, Kasahara Y, Kuroda M, Obika S, Kuwahara M*. Lantern-type G-quadruplex fluorescent sensors for detecting divalent metal ions. ***Anal Biochem.*** **2024**, *690*, 115525.
2. Hayashi H, Enami A, Fujita H, Kuroiwa S, Ohashi K, Kuwahara M, Osaka T, Momma T. Field-effect transistor biosensor with signal amplification by ternary initiation complexes for detection of wide-range RNA concentration. ***Talanta.*** **2024**, *273*, 125846.
3. Minagawa H, Kataoka Y, Fujita H, Kuwahara M*, Horii K, Shiratori I, Waga I. Modified DNA Aptamers for C-Reactive Protein and Lactate Dehydrogenase-5 with Sub-Nanomolar Affinities. ***Int J Mol Sci.*** **2020**, *21*, 2683.
4. Minagawa H, Kataoka Y, Kuwahara M*, Horii K, Shiratori I, Waga I. A high affinity modified DNA aptamer containing base-appended bases for human β-defensin. ***Anal Biochem.*** **2020**, *594*, 113627.
5. Minagawa H, Shimizu A, Kataoka Y, Kuwahara M*, Kato S, Horii K, Shiratori I, Waga I. Fluorescence Polarization-Based Rapid Detection System for Salivary Biomarkers Using Modified DNA Aptamers Containing Base-Appended Bases. ***Anal Chem.*** **2020**, *92*, 1780.
6. Hoshino H, Kasahara Y, Kuwahara M*, Obika S. DNA Polymerase Variants with High Processivity and Accuracy for Encoding and Decoding Locked Nucleic Acid Sequences ***J Am Chem Soc.*** **2020**, *142*, 21530.
7. Idili A, Arroyo-Currás N, Ploense KL, Csordas AT, Kuwahara M, Kippin TE, Plaxco KW. Seconds-resolved pharmacokinetic measurements of the chemotherapeutic irinotecan in situ in the living body. ***Chem Sci.*** **2019**, *10*, 8164.

Enhanced selectivity over topology and altered targeting by fluorescent G4 binder modifications

Masayasu Kuwahara

Graduate School of Integrated Basic Sciences, Nihon University, Tokyo 156-8550, Japan

Abstract

G-quadruplex (G4) has several binding sites, and G4 binders bind in end-stacking, groove-binding, and intercalation modes. Thioflavin T (ThT) is one of the fluorescent G4 binders, and is considered to bind mainly in end-stacking mode. In the end-stacking mode, it is speculated that in antiparallel G4s, the methyl group at the N3 position of ThT has a relatively large steric overlap with the G-quartet, while in parallel G4s, it is relatively small. Therefore, if the methyl group is replaced with a larger substituent, the relative fluorescence intensity for parallel G4s with relatively small overlap will be greater than that for antiparallel G4s with relatively large overlap. Therefore, it may be possible to create ThT derivatives with higher topology selectivity by examining the substituents to be introduced. In addition, introduction of an aminoalkyl group at the N3 position allows the introduction of various substituents via amide bonds, etc., so ThT derivatives modified with ligand molecules or chelators may be used as target-specific fluorescent probes. We have previously demonstrated that conjugates with protein ligands such as desthiobiotin and cortisol exhibit concentration-dependent fluorescence responses in the presence of target proteins. In addition, conjugates with ethylenediaminetetraacetic acid (EDTA), a chelator of divalent metal ions, exhibited increased or decreased fluorescence responses in the presence of G4 depending on the type and concentration of the divalent metal ion, demonstrating their properties as indicators of divalent metal ions.