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2024-Present	Professor, Kyoto Koka Women's University
2005- 2024	Professor, Kyoto University
2002-2005	Lecturer, Kyoto University
1994-2002	Assis. Prof., Kyoto University
1992-1994	Assis. Prof., Kyoto Institute of Technology
1988-1991	Postdoctoral Researcher (Columbia University & CalTech, USA)
1988 PhD	Kyoto University
1982 BA	Kyoto University

Research Interests:

Single-molecule DNA Analysis, Optical Mapping, Microfluidics, Electron Microscopy

Selected Publications:

1. Krishnamurthy, K., Rajendran, A., Nakata, E., **Morii**, **T**.* Near Quantitative Ligation Results in Resistance of DNA Origami Against Nuclease and Cell Lysate. ***Small Methods*** **2023**, e2300999.

2. Zhang, S., Nakata, E., Lin, P., **Morii**, **T**.* An Artificial Liposome Compartment with Size Exclusion Molecular Transport. ***Chem. Eur. J.***, **2023**, e202302093.

3. Lin, P., Dinh, H., Morita, Y., Nakata, E., **Morii**, **T**.* Dynamic Assembly of Cascade Enzymes by the Shape Transformation of a DNA Scaffold. ***Adv. Funct. Mater.*** **2023**, 2215023.

4. Hirose, H., Nakata, E., Zhang, Z., Shibano, Y., Maekawa, M., **Morii**, **T**.,* Futaki, S.* Macropinoscope: Real-Time Simultaneous Tracking of pH and Cathepsin B Activity in Individual Macropinosomes. ***Anal. Chem.***, **2023**, *95*, 11410-11419.

5. Rajendran, A.; Krishnamurthy, K.; Giridasappa, A.; Nakata, E.; **Morii**, **T**.* Stabilization and structural changes of 2D DNA origami by enzymatic ligation. ***Nucleic Acids Res.,*** **2021**, *49,* 7884-7900.

6. Nakata, E., Hirose, H., Gerelbaatar, K., Arafiles, J. V. V., Zhang, Z., Futaki, S.; **Morii**, **T**.* A facile combinatorial approach to construct a ratiometric fluorescent sensor: application for the real-time sensing of cellular pH changes. ***Chem. Sci.***, **2021**, *12*, 8231-8240.

Toward the construction of artificial organelles

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Abstract

Cells have used compartmentalization to implement complex biological processes involving thousands of enzyme cascade reactions. Enzymes are spatially organized into the cellular compartments to carry out specific and efficient reactions in a spatiotemporally controlled manner. These compartments are subdivided into membrane-bound and membraneless organelles. Mimicking such cellular compartment systems has been a challenge for years.

DNA nanostructures provide useful scaffolds for spatially assembling the enzymes associated with a given metabolic pathway. Sequence-specific DNA-binding protein adaptors are used to stably localize the enzymes to defined specific positions on the scaffold of DNA nanostructures. The system allows not only the systematic evaluation of how the distance, orientation, and ratio of the enzymes control the reactions of the enzyme cascade, but also the construction of a compartment equipped with molecular transport and metabolic reactions. Our approach to constructing biomimetic systems towards an artificial organelle with a metabolic cascade will be discussed.