

Hiroyuki Noji

Professor, The University of Tokyo



I. Short Biography

Professor Hiroyuki Noji, a Professor of the Department of Applied Chemistry, The University of Tokyo, is a Single-Molecule Biophysicist. He has been studying the chemomechanical coupling mechanism of F_0F_1 ATP synthase using single-molecule techniques. He is also known as an inventor of the femtoliter chamber array system for single-molecule enzymatic assays that is currently applied in digital bioassays including single-molecule digital ELISA. Professor Noji was trained under the supervision of Prof. Masasuke Yoshida and received his Ph.D from Tokyo Institute of Technology in 1997. After a postdoctoral Fellowship in the laboratory of Prof. Kazuhiko Kinoshita, Jr., he was appointed as an Associate Professor at the Institute of Industrial Science, The University of Tokyo in 2001. In 2005, he moved to the Institute of Scientific and Industrial Research, Osaka University as a full professor. Since 2010, he is a Professor of Department of Applied Chemistry, The University of Tokyo.

II. Curriculum Vitae

1. Name

Hiroyuki Noji (Born in 1969)

2. University Education

PhD, the Department of Electronic Chemistry, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, December 1997

3. Scientific Positions

- Professor, Department of Applied Chemistry, the University of Tokyo (2010-present)
 - Research supervisor of PRESTO ‘Supra-assembly of biomolecule’ program, Japan Science and Technology Agency (JST), Japan (2020-2024)
https://www.jst.go.jp/kisoken/presto/en/research_area/ongoing/area2020-1.html
 - Program manager of ImPACT program ‘Artificial cell reactor technology’, Japan Science and Technology Agency (JST) (2016-2019)
<https://www.jst.go.jp/impact/en/program/14.html>

- Professor, Institute of Scientific and Industrial Research, Osaka University(2005-2010)
- Associate Professor, Institute of Industrial Science, The University ofTokyo (2001-2005)
- Researcher, PRESTO, Japan Science and Technology Agency (JST)(2000-2001)
- Post-doctoral researcher, CREST team 13, Japan Science and Technology Agency (JST) (1998-2000)

4. Scientific contributions (Peer reviewed papers, 206; H-index, 54; Times cited, 12,964 (Web of Science), as of March 06, 2024)

- **Single-molecule biophysics on ATP synthase**
 - Single-molecule observation of rotation of F₁-ATPase (*Nature* 1997, 2001, *Cell* 1998)
 - ATP synthesis of F₁-ATPase upon reversed rotation (*Nature* 2004, 2005)
 - Intrinsic allostery of stator ring of F₁-ATPase (*Science* 2011, *Nat. Comm.* 2022)
 - Rotation of ATP synthase under ATP synthesis condition (*Nat. Comm.* 2013)
 - Redesigning of F₁ motor (*JACS* 2012, *PNAS* 2016)
 - Reaction scheme of F₁-ATPase (*Cell* 2011, *Nat. Chem. Bio.* 2010, 2011, *Nat. Comm.* 2011, 2014, 2015, 2021, *PNAS* 2020a, 2020b)
 - Inhibitory mechanism of IF₁ (*Nat. Comm.* 2023, *Protein Science* 2024)
- **Digital bioassay**
 - Femtoliter reaction chamber array for single molecule analysis (*Nat. Bio.* 2005, *Lab on a chip* 2010,)
 - Digital Bioassays (*Lab on a chip* 2011a, 2011b, 2018, *Sci. Adv.* 2020, *Anal. Chem.* 2017, 2021)
 - Arrayed Lipid Bilayer Chamber (*Nat. Comm.* 2014, *Lab on a chip* 2016, *PNAS* 2018)
 - Heterogeneity of enzymes and implication of enzyme evolution (*JACS* 2021)
- **Artificial cell reactor technology**
 - Accurate high-throughput screening based on digital gene expression (*Sci. Adv.* 2019)
 - Cell-free gene expression under crowding conditions (*ACS synth. Biol.* 2018)
 - Femto-liposome system (*ACS Nano* 2020)
 - Digital gene replication (*ACS synth. Biol.* 2021)
- **Single cell analysis of intracellular ATP level**
 - Visualization of ATP level in single cells (*PNAS* 2009)
 - Diversity of ATP level among clonal *E. coli* cells (*Sci. Rep.* 2014)
- **Others**
 - High-speed analysis of kinesin stepping (*Nat. Chem. Bio.* 2016)
 - Ghost cytometry (*Science* 2018)

5. Awards (Grant awards are omitted)

- **Nakatani Grand Prize**, Nakatani foundation 2020
- **Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology**, MEXT 2016
- **Yomiuri Gold Medal Prize**, Yomiuri foundation 2015
- **Nakatani Incentive Prize**, Nakatani foundation 2015
- **Inoue Science Research Award**, Inoue Foundation for Science 2013
- **Yamazaki Teiichi Prize**, Foundation for Promotion of Material Science and Technology 2013
- **JSPS Prize**, Japan Society for the Promotion of Science 2006
- **Tejima Prize for Doctoral Dissertation Award**, Tejima Seiichi Commemorative Foundation 1999
- **Grand Prize**, Amersham Pharmacia Biotech & Science Prize for Young Scientists 1998

6. Organization of conferences (conference chair only)

- IUPAB2024, Kyoto (Japan)
- 2nd Tokyo ATPase Workshop, Tokyo (Japan), 30 September 2019
- ImPACT symposium “Artificial cell reactor science and technology”, Tokyo (Japan), 5-6 April 2018
- 1st Tokyo ATPase Workshop, Tokyo (Japan), 2-3 June 2014
- International Symposium “Innovative Nanoscience of Supermolecular Motor Proteins working in Biomembranes”, Kyoto (Japan), 7-9 Sept. 2009
- International Symposium of Post-Silicon Materials and Devices Research Alliance Project, Osaka (Japan), 5-6 Sept. 2009
- The 17th CDB Symposium “Towards Synthesis of Cell”, Kobe (Japan) 14-15 Oct. 2008
- 10th Sanken International Symposium on Nanoscience and Nanotechnology 2006, Osaka (Japan), 19-20 Sept. 20

7. Other Contributions

➤ **Journal Editorial Board**

- ✧ Editorial Board of *Biophysical Reviews*, 2015-present
- ✧ Editorial Advisory Board of *Protein Science*, 2009-present
- ✧ Editorial Board of *Biophysical Society*, 2013-2019
- ✧ Editorial Board of *Biophysics and Physicobiology*, 2013-present

➤ **Scientific organization**

- ✧ President, *Biophysical society of Japan* (2021-2023)

- ✧ Vice president, *Biophysical society of Japan* (2017-2019)
- ✧ Council member, *Biophysical society of Japan* (2006-2007, 2010-2013, 2015-2017)
- ✧ Council member, *Protein society of Japan* (2006-2007, 2014-2018)
- ✧ Chair, IUPAB/Biophysics committee, *Science Council of Japan*, Cabinet office, Government of Japan (2017-present)
- ✧ Council member, *International Union of Pure and Applied Biophysics (IUPAB)*, (2014-2020)
- ✧ Council member, *Asian Biophysics Association (ABA)*, (2014-present)
- ✧ Council member, *Protein society* (US), (2015-2017)
- **Project leader/Project manager**
 - ✧ Project leader, ‘Autonomous artificial cell reactor’, CREST, Japan Science and Technology Agency (JST), Japan (2019-present)
 - ✧ Program manager, ‘Artificial cell reactor technology’, ImPACT, Japan Science and Technology Agency (JST), Japan, 2016-2019
 - ✧ Project leader, ‘Digital Counting of biomolecules’, CREST, Japan Science and Technology Agency (JST), Japan, 2010-2016
 - ✧ Project leader, ‘Innovative Nanobioscience’, Grant-in-Aid for scientific research on priority areas, The Ministry of Education, Culture, Sports, Science and Technology (MEXT), 2007-2011
 - ✧ Project leader, ‘Nanobiotechnology for membrane proteins’, Bio-oriented Technology Research Advancement Institute (BRAIN), 2002-2007