Professor Takamasa Sagara

Laboratory of Electrochemistry of Soft-Matters at Nagasaki University, Japan

2022 dec

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Major
Analytical Electrochemistry
Electrochemistry Molecular Assembly
Hydrogel Soft-robotics
Spectro-electrochemistry

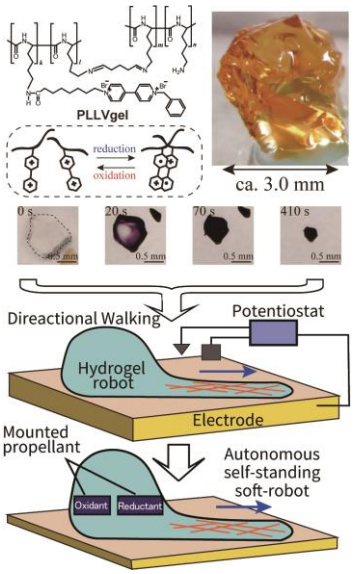
Main Research

1. Design and Construction of Molecular Robots using Molecular Engine at Electrified Interface: **A reversible high-speed movement of a hydrogel soft-robot with a large amplitude should be realized. The hydrogel may crawl like an amoeba by electrochemical control.** (**right-lower figure**)

B. Wang, H. Tahara, **T. Sagara**, "Driving quick and large amplitude contraction of viologen-incorporated poly-*L*-lysine-based hydrogel by reduction", ***ACS Appl. Mater. Interfaces*** **2018**, *10*, 36415–36424 and "Enhancement of deformation of redox-active hydrogel as an actuator by increasing pendant viologens and adding filler or counter-charged polymer", ***Sens. Actuators, B*** **2021,** *331*, 129359: 1-13.

2. Electrochemistry of Viologens: *from* Ionic Liquid *to* Self-Assembled Monolayers: **From ionic liquids to organized monolayers, color change and fast electron transfer of viologen redox are attractive. Viologen redox is also used to drive the molecular robot.**

T. Sagara, T. Tahara, "Redox of viologen for powering and coloring", ***Chem. Rec.*** **2021**, *21*, 2375-2388. H. Tahara, …, **T. Sagara** (+ 5 authors), "A redox-active ionic liquid manifesting charge-transfer interaction between a viologen and carbazole and its effect on the viscosity, ionic conductivity, and redox process of the viologen", ***Chem. Sci.*** **2021**, *12*, 4872-4882. **T. Sagara**, Y. Hagi, M. Toyohara, "Binding of Sulfate-Terminated Surfactants with Different Alkyl Chain Lengths to Viologen Sites Covalently Embedded in the Interior of a Self-Assembled Monolayer on a Au Electrode", ***Langmuir*** **2022**, *38*, 979–986.



3. Electroreflectance Spectroscopy at Electrified Interface

T. Sagara, "UV-visible reflectance spectroscopy of thin organic films at electrode surfaces", *Advances in Electrochemical Science and Engineering*, Vol. 9 (2006), Chap. 2 (pp. 47-95).

Other Research topics:

Electrochemically Driven Oil Droplet in Water, Phase Transition of Organic Monolayer by Redox Reaction, Surface Modification of ITO electrode with Redox-Active Monolayer, Gold Nanoparticles at Electrified interfaces, and Bio-electrochemistry.

Research Key Words

Molecular robot, Viologen, Hydrogel, Electroreflectance methods, Functional Electrode

Title of TMGH grant research 2022

Development of advanced electro-active hydrogel material showing capabilities of pathogen collection, killing, and analysis

Note

ResearchMap: https://researchmap.jp/read0043411?lang=en

Lab HP: https://www.cms.nagasaki-u.ac.jp/lab/douteki/en/index.html

Res-Map Lab-HP

Dr. Sagara was born in 1960 in Tokyo, graduated from Yokohama National Univ., and obtained a Ph. D. (Engineering) from Graduate School of Engineering of The Univ. of Tokyo in 1987. He joined Nagasaki Univ. as an Associate Professor and was promoted to a full Professor in 2004. He received the Excellent Young Chemist prize from the Chemical Society of Japan in 1994. His research was supported by the PRESTO (JST) grant in 1999–2003. He was the Editor-in-Chief (2008–2013) of *Review of Polarography* and the President of the Polarographic Society of Japan (2020-2021). He was awarded as the best reviewer of grant screenings. He edited and wrote a basic chemistry textbook "University Basic Chemistry for the Faculty of Science and Engineering", 2019. He is currently serving as Vice Dean of the Graduate School of Engineering, Nagasaki University.