

## History of ECSJ Awards and Introduction of Award Winners in 2021

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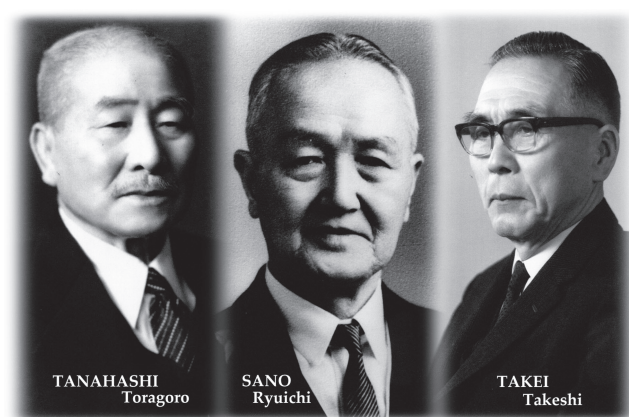
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### ABSTRACT

The Electrochemical Society of Japan (ECSJ) has been publishing comprehensive papers related to the achievements of researchers who are awarded by ECSJ annually since 2014. The origin of the society awards, we can see that they began as Tanahashi Paper Award. In order to promote the use of this journal an academic and industrial outcomes from the activity of ECSJ members, the editorial board would like to introduce the society awards and the awardees' achievements as an award-winning feature article.



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### 1. Introduction

Articles “Vision” in this journal, *Electrochemistry*, had been published until 2020. These articles have expressed opinions of the Board Members of the Electrochemical Society of Japan (ECSJ) and the future prospects of electrochemistry by electrochemists in Japan and abroad. Since the editorial committee decided to derive the Japanese journal “*Denki Kagaku*” in 2018 from former style of *Electrochemistry*, we have suspended “Vision”. However, we believe that Editorial is an important guideline to make the ideas of the society known internationally. This article is the first of its kind and was written by a board member of ECSJ and an editorial board.

As the first topic, we would like to introduce the society awards of ECSJ.<sup>1–3</sup> Since this is the first time that the awards are introduced in English, the history of each award will be reviewed. This issue contains comprehensive articles requested by the winners of the various society awards of ECSJ in 2021. Brief biographies of the authors of the papers are given in each article, but this article gives a brief overview of the reasons for the awards.

### 2. History of the Society Awards of ECSJ

ECSJ grants various society awards, including three historical awards named after past presidents. The society awards were established sequentially starting in 1952 to recognize members who have made outstanding achievements in research and development in the field of electrochemistry.

On October 30, 1950, TANAHASHI Toragoro (棚橋寅五郎: 1866–1955, Fig. 1), whose name still remains on Technical Development Award of ECSJ, donated 5000 shares of his stock in Nippon Chemical Industry Corporation to ECSJ.<sup>4,5</sup> The first Tanahashi Award as the society award was called until September 1951<sup>6</sup> and given firstly in April 1952 (Fig. 2).<sup>7</sup> TACHI Isamu (Kyoto University) received Tanahashi Paper Award for his research on polarography,<sup>8</sup> and EHARA Kosuke (NKK Corporation) received Tanahashi Technology Award for his success in the production of ferromanganese using low-grade manganese ore.<sup>9</sup> Since then, ECSJ had given 25 awards for papers and 22 awards for technology from 1952 to 1976 for the results of electrochemical research and development.

Sano Progress Award named after SANO Ryuichi (佐野隆一: 1889–1977, Fig. 3) is established in 1962 which had been given to an individual young researcher or engineer.<sup>5,10</sup> Sano was one of the founders of Tekkosha (predecessor of Tohoku Tosoh Chemical Co., Ltd.) and was intended to contribute to the progress of electrochem-

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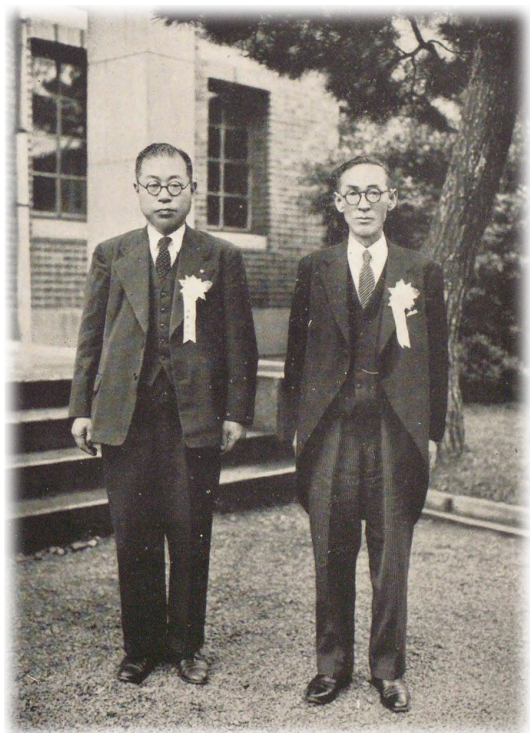
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**Figure 1.** TANAHASHI Toragoro (1866–1955). He merged and developed Nippon Chemical Industry Corporation, founded in 1908, with a company that originated from his own pharmaceutical factory founded in 1893 with the aim of establishing a chemical industry by utilizing domestic resources. In 1910, he created potassium chlorate which is an important raw material for the manufacture of matches, by electrolysis of potassium chloride, a by-product of iodide. He served as the 2nd president of The Electrochemical Association of Japan (ECAJ, predecessor of ECSJ) from 1935 to 1936.



**Figure 3.** SANO Ryuichi (1889–1977). He founded Tekkosha (predecessor of Tohoku Tosoh Chemical Co., Ltd.), and grew into one of Japan's leading integrated electrochemical manufacturers, and served as its president and chairman. He was honored as the first honorary citizen of Mishima city by his great contribution to the culture of Mishima where he was born, and has been known as the “Father of Mishima City”. He established the Sano Art Museum based on the antiques he collected in 1966. He served as the 8th president of ECAJ and subsequent ECSJ from 1947 to 1948.



**Figure 2.** Photograph of the first winners of Tanahashi Award at the 19th Annual Meeting of the Electrochemical Society of Japan held at Kyoto University in 1952. The awardee of Tanahashi Paper Award, TACHI Isamu, a professor of Kyoto University (right), and the awardee of Tanahashi Technology Award, EHARA Kosuke, the director of Niigata Electric Steel Works of NKK corporation (presently JFE Steel Corporation), (left).

ical industry through the encouragement of young members. Sano contributed to the establishment of Sano Progress Award in November 1961 by providing the Electrochemical Society of Japan with 500000 yen per year in Sano fund for a period of 10 years. The first Sano Progress Award was earned by three recipients, ISHIBASHI Nobuhiko of Kyushu University, SENDA Mitsugu of Kyoto University, and HARUYAMA Shiro of Tokyo Institute of Technology at the 29th Annual Meeting held in April 1962.<sup>11</sup> Currently, Young Researcher Award of ECSJ (Sano Award) continues as the succeeding award, and up to three awardees have been selected per year.

Currently, The Award of ECSJ is named after TAKEI Takeshi (武井武: 1899–1992, Fig. 4) of Tokyo Institute of Technology, a renowned researcher on ferrite who donated his fund to ECSJ in 1977.<sup>12</sup> At the ECSJ general assembly held in February 1977, the existing awards were re-launched as awards named after their funders. Among them, the Takei Award was established as the society award inheriting the lineage of Tanahashi Paper Award, and is given to an individual researcher who have made outstanding achievements in the fields of electrochemistry and industrial physical chemistry. At that time, Takei Award was given to HAYASHI Tadao of Osaka Prefecture University, the author for the excellent papers.<sup>13</sup> The fact that the comprehensive paper is invited to be contributed to *Electrochemistry* is a remnant of Tanahashi Paper Award which is the ancestor of Takei Award. Since 1992, the award has been continued as The Award of ECSJ (Takei Award), which 29 outstanding researchers have earned.

Scientific Achievement Awards of ECSJ other than the society awards with names are given to mid-career members who has made significant academic achievements. This awards was established in 1987 by donation of the executive committee of the First International Meeting on Chemical Sensors (IMCS) chaired by





**Figure 4.** TAKEI Takeshi (1899–1992). He was born in Saitama, Japan. He graduated from Tohoku Imperial University. He earned professorship at Tokyo Institute of Technology and later at Keio University. In 1930, he invented the cobalt-ferrite (O-P) magnet, a metal oxide magnet together with KATO Yogoro, and laid the foundation for the ferrite industry. He was awarded the Honda Memorial Prize in 1964, and was named a Person of Cultural Merit in 1978. He served as the 16th president of ECSJ from 1961 to 1962.



**Figure 5.** KATO Yogoro (1872–1967). He was born in Kariya, Aichi, Japan. He graduated from Harris Science School (currently Doshisha University) and Kyoto Imperial University. He earned professorship in Tokyo Higher Technical School, later Tokyo Institute of Technology. In 1930, he invented and patented ferrite core with TAKEI Takeshi. He served as the 1st president of ECAJ from 1933 to 1934. He was awarded an Order of the Sacred Treasure in 1935 and named a Person of Cultural Merit in 1957. After he died, he was nominated Honorary Citizen of Kariya city.

KIYOYAMA Tetsuro, which was held as part of the 50th anniversary of the founding of ECSJ.<sup>14,15</sup> The first awardee was FUJISHIMA Akira of Tokyo University.<sup>16</sup> Initially started under the name of Research Encouragement Award, and its name was changed to current one in 1992.<sup>17,18</sup> Until recently, the award was given to a single recipient. Since it had been a fiercely competitive award with a large number of nominee each year, the number of recipients has been limited to two since 2020.

In 1991, the award policy of ECSJ were wholly renewed with changes in award names and the addition of new awards, Excellent Paper Award of ECSJ and the Executive Contribution Award of ECSJ.<sup>15,19</sup> The Executive Contribution Award is presented to an ECSJ member who has been active as a member for many years and has made outstanding contributions to the progress and development of electrochemistry and industrial physical chemistry.

The editorial board of *Electrochemistry* would have to introduce Excellent Paper Award of ECSJ. This award was prepared in accordance with the revision of the award policy of ECSJ in 1991, and was conferred in 1992.<sup>15,20</sup> This award is given to an original paper submitted to *Electrochemistry* annually, and is nominated by a first round of voting by the Editorial Board and a second round of selection by Editor-in-chief members. There is no requirement for membership in the Society to be eligible for this award. Authors, including foreign ones, have received this in the past.<sup>21</sup> The maximum number of awards is four per year.

The most recently established society award to be given to an individual is Excellent Woman Researcher Award of ECSJ. In order to promote gender equality, this award is presented in 2011 and established in 2012 to be given to female researchers and engineers

who are expected to play active roles in the future by conducting highly original research or developing new technologies related to electrochemistry and industrial physical chemistry.<sup>22</sup> The first awardees were SAKAEBE Hikari of National Institute of Advanced Industrial Science and Technology (AIST) and SATO Yukari of AIST given at the 79th Annual Meeting of ECSJ held in April 2012.<sup>23</sup> This award is distinguished from the other individual awards by the fact that it is not limited to members of the society. A wide range of candidates to be expected their future activities are nominated.

This time, we summarized all awardees' list for each award in supporting information<sup>24</sup> in Excel file in Japanese.<sup>25,26</sup>

The society awards in 2021 were awarded at the 88th Annual Meeting held online due to COVID-19 pandemic. As the awardees have already been introduced,<sup>24</sup> a brief introduction of each awardee and their achievements will be given in the following section.

Finally, the authors would like to mention KATO Yogoro (加藤 與五郎: 1872–1967, Fig. 5), one of the founders of the Electrochemical Association of Japan (ECAJ, predecessor of ECSJ). Kato, who was also the first president of ECAJ, left his name on Kato Memorial Award of Kato Memorial Foundation, which ECSJ is a designated nominating organization for the award. The three founders mentioned above all had a very close relationship with Kato, as they were mentored by him and collaborated on their research and development for electrochemistry. Although the origin of the award is different from the ones in this article, we would like to mention that Kato Memorial Lecture is given at every annual meetings of ECSJ and thanks to the donation of Kato Memorial Foundation.

### 3. Introduction of 2021 Award Winner

#### 3.1 The Award of The Electrochemical Society of Japan (Takei Award)

The Award of ECSJ (Takei Award) in 2021 are given to KANNO Ryoji.

The awardee, Kanno is currently an innovative research professor of Tokyo Institute of Technology. He earned Doctor of Science from Osaka University in 1980. He was an assistant professor at Mie University from 1980 to 1989. In 1989, he moved to Kobe University as an associate professor. In 2001, he promoted a professor at Tokyo Institute of Technology. Over a long period of time, Kanno has devoted himself to the research and development of superionic conductors and solid electrolytes. In addition, he has demonstrated several important concepts for exploring new generation of energy storage devices such as the all-solid-state batteries. In this way, he has made many achievements in the field of electrochemistry, including research on clarifying the electrochemical reaction mechanisms of energy storage devices and their applications, based on his material development. He has published numerous highly cited papers<sup>28–31</sup> and contributed his papers with many coauthors in *Electrochemistry* lastly,<sup>32–34</sup> and one of them has received Excellent Paper Award of ECSJ.<sup>32</sup>

#### 3.2 Scientific Achievement Award of The Electrochemical Society of Japan

Scientific Achievement Awards of ECSJ in 2021 are given to AOKI Yoshitaka and SHIRAISHI Soshi.

The awardee, Aoki is currently an associate professor of Hokkaido University. Aoki received his PhD in engineering from Hokkaido University in 2002. He was a postdoctoral research fellow at Massachusetts University, RIKEN, and RWTH-Aachen. In 2010, he took a position of an assistant professor at Hokkaido University, and became an associate professor in 2010. Aoki has made pioneering research achievements in the development of novel electrode and electrolyte materials for protonic ceramic fuel cells and steam electrolyzers,<sup>35</sup> as well as in the operating principles of devices constructed by combining these materials.<sup>36–38</sup> Recently, he contributed the articles for hydrogen permeability of metal nitrides membranes with hydridic defects in society journal.<sup>39</sup>

Another awardee, Shiraishi is currently a professor of Gunma University. He received his PhD in energy science from Kyoto University in 1999. In 1997, he was elected an assistant professor at Gunma University, and became an associate professor in 2006. In 2013, he became a professor at the same university. Shiraishi has achieved the development of new carbon electrode materials, evaluation of their basic physical properties, and their electrochemical applications such as capacitors. In addition, he is currently playing a leading role in the field of carbon electrodes for electrochemical capacitors. His major works are introduced in his comprehensive paper and herein.<sup>40</sup>

#### 3.3 Technical Development Award of The Electrochemical Society of Japan (Tanahashi Award)

Technical Development Awards of ECSJ (Tanahashi Award) in 2021 are given to the following 2 groups.

The awardees for R&D electrodeposition coating technology to the cell stack of solid oxide fuel cells (SOFCs) are NAKANO Takayuki (Chief researcher of Osaka Gas Co. Ltd.), INOUE Shuichi (Manager of Osaka Gas Marketing Co. Ltd.), SAITO Tadashi (Manager of Osaka Gas Marketing Co. Ltd.), TSUKAMOTO Zendo (Managing director of SHIMIZU Co. Ltd.), NISHIMURA Shigefumi (Advisor of SHIMIZU Co. Ltd.), and FUJIMOTO Tetsuro (Deputy manager of Kyocera Corporation). They have achieved both improved power generation efficiency and durability while reducing costs and making the cell stack more compact by applying

their original electrodeposition coating technology to the cell stack of SOFCs. This electrodeposition coating technology was incorporated in the ENE-FARM Type-S released in April 2016, and will continue to be incorporated in the latest ENE-FARM Type-S model, which was remodeled in 2020, making a significant contribution to durability, reliability, and high efficiency. The awardees' activity is summarized in their comprehensive paper and herein.<sup>41</sup>

The awardees for quasi-solid-state electrolyte (QSE) are OKUMURA Takefumi (Department manager of Hitachi, Ltd.) and KAWAJI Jun (Senior researcher of Hitachi Ltd.). They have developed the quasi-solid-state electrolyte (QSE) consisting of solvate ionic liquid and oxide particles for ensuring a safety of a large capacity lithium ion battery (LIB). In this work, they fabricated a 100 Wh-class laminated LIB cell and evaluated its safety and charge-discharge performances, and it will give useful knowledge on a promising electrolyte to realize a reliable and high performance LIB for future energy storage devices. The awardees' activity is summarized in their comprehensive paper and herein.<sup>42</sup>

#### 3.4 Young Researcher Award of The Electrochemical Society of Japan (Sano Award)

Young Researcher Awards of ECSJ in 2021 are given to GUNJI Takao, MINAMIMOTO Hiro, and YOSHII Kazuki.

The awardee, Gunji is currently an assistant professor of Kanagawa University. He received his PhD in engineering from Kanagawa University in 2017. After receiving his PhD, he was an adjunct assistant professor at the University of Electro-Communications. In 2018, he was elected an assistant professor at Kanagawa University. Gunji has developed Pt- and Pd-based ordered intermetallic compounds and applied in electrochemical reactions. Among the alloys, he has been focusing on a substance called "intermetallic compound" with high atomic order. Moreover, he designed new intermetallic compounds and applied them to fuel cell electrocatalysts and cocatalysts for photocatalytic and electrochemical reduction of CO<sub>2</sub>.<sup>43</sup>

Another awardee, Minaminoto is currently an assistant professor of Hokkaido University. He received his PhD in engineering from Osaka University in 2015. After receiving his PhD, he was elected an assistant professor at Hokkaido University. He has investigated on the precise control of the nanoscale interface, aiming at the efficient control of electro- or photoelectrochemical reactions. Through the attempts, he has successfully established the electrochemical nanostructure control method and functionalized the nanostructured electrode interface, leading to the unique electrochemical reaction properties.<sup>44</sup>

The third awardee, Yoshii is currently a researcher of National Institute of Advanced Industrial Science and Technology (AIST). He received his PhD from Osaka University in 2014. He started his academic career at Keio University in 2014 as a Research Associate. In 2017, he moved to AIST as a Researcher. Yoshii have been researching materials synthesis and energy devices using room temperature ionic liquids (RTILs) and organic electrolytes. Especially, he focused on the electrodeposition of metals and preparation of metal nanoparticles using RTILs and secondary batteries using nonaqueous electrolytes.<sup>45</sup> One of his work related to lithium metal negative electrode has been frequently read.<sup>46,47</sup>

#### 3.5 Excellent Woman Researcher Award of The Electrochemical Society of Japan

Excellent Woman Researcher Awards of ECSJ in 2021 are given to ISHII Ayumi and FUJITA Kyoko.

The awardee, Ishii is currently an associate professor of Teikyo University of Science. Ishii received her PhD from Aoyama Gakuin University in 2008. After receiving her PhD, she was a researcher at SONY Corporation. She started her academic career at Toin University of Yokohama in 2011 as an assistant professor. In 2012,

she moved as an assistant professor at Aoyama Gakuin University. In 2018, she promoted to a project lecturer at Toin University of Yokohama. In 2021, she moved to Teikyo University of Science as an associate professor. From a materials science perspective, Ishii has achieved highly original results in generating the energy and obtaining optical information of light with high efficiency using functional electrodes.<sup>48</sup> In addition to her research, she is also actively engaged in outreach activities to foster future female researchers.<sup>49</sup>

Another awardee, Fujita is currently a lecturer at Tokyo University of Pharmacy and Life Sciences. She received her PhD from Tokyo University of Agriculture and Technology in 2004. She was a postdoctoral research fellow at Monash University and Tokyo University of Agriculture and Technology. In 2011, she was a project assistant professor at Tokyo University of Agriculture and Technology and promoted to a lecture at same university in 2013. In 2016, she moved to Tokyo University of Pharmacy and Life Sciences as a lecturer. Fujita has a strong interest in the engineering applications of biomolecules. In particular, she has focused on the structure and function of proteins, and has conducted research on bioelectrochemistry with the keywords of optical waveguide spectroscopy, ionic liquids, and intestinal excretion.<sup>50</sup> Fujita has also given many lectures on her experiences as a female researcher at summer schools for high school girls, citizen forums, and so on.<sup>51</sup>

### 3.6 Excellent Paper Award of The Electrochemical Society of Japan

In 2020, four papers are awarded from 110 published papers in 2020 which are listed in the list of references.<sup>52–55</sup>

## 4. Summary

Each award given by the Electrochemical Society of Japan is an expression of the founders' extraordinary desire to promote electrochemistry and encourage researchers, and has been supported by the cooperation and contributions of many benefactors over the years. It is documented that this benevolence was continued by his successors presented with a certificate of appreciation in the 50th anniversary ceremony at the 50th annual meeting of ECSJ in 1983.<sup>56</sup> At present, each award is financed by membership fees from ECSJ members and many funds that have been raised over the years, and we are allowed to think back to those days through the names of the founders of each award.

All of the above awards are expected to be given not only for research achievements but also to the members of the society who should show the proper attitude as a researcher or engineer and be a role model for other members of the society. Candidates are nominated every summer, and winners are selected through a rigorous selection process. Since these awards are given by ECSJ whose activities are based in Japan, most of the recipients to date have been Japanese, and only few recipients are recognized in Excellent Paper Award, which is given to multiple recipients. Since one of the origins of the awards of ECSJ is Tanahashi Paper Award, it can be mentioned that ECSJ has expected the members to contribute the society through publication of their papers. It is the hope of Editorial Board of *Electrochemistry* that the invited comprehensive papers will contribute to the enhancement of the presence of these awards.

### Authors Contribution

Mahito Atobe: Conceptualization (Equal), Writing – review & editing (Lead)

Minoru Mizuhata: Conceptualization (Lead), Data curation (Lead), Writing – original draft (Lead)

### Data Availability Statement

The data that support the findings of this study are openly available under the terms of the designated Creative Commons License in J-STAGE Data at <https://doi.org/10.50892/data.electrochemistry.16621486>.

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