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Front-line Researchers

Hiroshi Sawada, Senior Distinguished Researcher, NTT Communication Science Laboratories

▼Abstract

From his extensive research in blind source separation, Senior Distinguished Researcher Hiroshi Sawada has received worldwide acclaim for his work with a domestic research partner on independent low-rank matrix analysis, namely, the development and integration of independent component analysis and non-negative matrix factorization. He has also ventured into the field of neural networks. We asked him about his research achievements and his attitude toward enhancing his research activities.
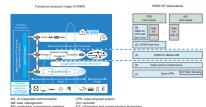
Feature Articles
Development of IOWN with Global Partners

Progress in the Development of IOWN Technology

▼Abstract

Technical improvements in full-stack layers are essential to develop a future infrastructure with higher capacity, lower latency, and lower power consumption toward a cyber-physical society. NTT announced its roadmap for this technology, the Innovative Optical and Wireless Network (IOWN), in April 2020 and has accelerated to implement the roadmap with global partners of the IOWN Global Forum (IOWN GF). IOWN GF developed and published a series of deliverables on Open All-Photonic Network (Open APN), IOWN for Mobile Network, Fiber Sensing for Open APN, Data-Centric Infrastructure, IOWN Data Hub, and a Reference Implementation Model. This article provides an overview of these deliverables and describes the growth of IOWN GF and its activities.

Regular Articles

### The Challenge to Develop an Artificial Photosynthesis Device that Fixes CO_2 Using the Sun

▼Abstract

Interest in reducing greenhouse gases, especially carbon dioxide (CO_2), as a measure against climate change is increasing not only in countries but also in companies around the world. The NTT Group has formulated a new vision for zero environmental impact and declared its intention to achieve carbon neutrality by 2040. We expect artificial photosynthesis that converts CO_2 and water (H_2O) into hydrocarbons and molecular oxygen (O_2) using solar energy to be a technology that contributes to CO_2 reduction. To introduce this technology to the market, it is necessary to improve its efficiency and durability. We propose a gas-phase CO_2 reduction reaction system to improve solar-to-hydrocarbon conversion efficiency η_{STC} and conducting basic research on electrodes that make up this system. We studied a nickel oxide/indium gallium nitride (NiO/InGaN) photoanode to achieve both high efficiency and long lifetime. We also studied a copper (Cu)-fiber cathode to improve efficiency. In our system using these electrodes, formic acid (HCOOH) was produced in 140 hours of continuous light irradiation, resulting in an η_{STC} of 0.16%.