



SPOTLIGHT ON GUNMA

PART OF A CONTINUING SERIES
PROFILING COMPANIES AND
INSTITUTES IN SPECIFIC REGIONS



The miracle of carbon alloy

At the university's Center of Advanced Carbon for Hydrogen Technologies, Jun-ichi Ozaki works hard to realize a low-carbon, hydrogen energy-based society by developing sophisticated carbon materials. Ozaki found that a minute spherical carbon nanostructure has a catalytic effect. His discovery gave the world hope that his new "carbon alloy catalyst," made with an earth-abundant element, could eliminate the use of platinum, an expensive rare metal, in fuel cells and thus reduce the cost of hydrogen cars in the future.

"It's a scientist's dream to create energy without using platinum," says Ozaki, and carmakers are no different. One of the biggest obstacles for the commercialization of clean-energy cars is the untenably

expensive platinum needed as a catalyst for the energy-producing hydrogen reactions. By infusing boron and nitrogen into a carbon, Ozaki succeeded in enhancing the carbon alloy's catalytic power to the same level as that of platinum.

The creation of carbon-based eco-friendly hydrogen-powered cars is not the only product Ozaki envisions. His ultimate goal is to "establish an efficient system to produce hydrogen gas with carbon, store it, and use it as an energy source." With his team's outstanding research results, Gunma University was chosen by the Japanese government to be one of 18 domestic research centres receiving public money to fund the development of low-carbon technologies. The centres listed under the government-backed

low-carbon research network (LCnet) have privileged use of advanced facilities installed at member organizations to better translate their innovative research into practical applications. Ozaki's team is making use of the facilities to explore the basic principles of the carbon alloy catalyst and the best ways to apply them, research for which Ozaki has received an additional government grant.

Gunma University's Faculty of Engineering has more than half a century of history researching silicon and carbon. Building upon its solid research foundation, the school will continue its collaborations with industry to transform scientific discoveries into commercial practice as part of its overarching mission to help build a more sustainable society. ■

NISSHINBO HOLDINGS INC.

NISSHINBO

Accelerating the practical use of carbon alloy catalysts

The Nisshinbo Group aims to be "the eco-company" through its development of materials and products that will enable the realization of a hydrogen-based, low-carbon emission society and be instrumental in creating a cleaner, more sustainable future for our Earth.

Since 2006, Nisshinbo Holdings Inc. and Professor Ozaki at Gunma University have been collaborating on the investigation of a rare-metal-free carbon alloy catalyst used as electrodes in fuel cells. With the establishment of the Nisshinbo Advanced Carbon Engineering Chair at Gunma University in 2011, they are now able to work even more closely to realize

the practical use and commodification of the catalyst, focussing on further improvements in material quality, reliability and durability as well as the necessary mass production technology. The chair covers the study of the catalytic mechanism, material manufacturing techniques, material application technology and development of hydrogen storage carbon material for fuel cell systems.

The Nisshinbo Group and Gunma University are both active in promoting the usefulness of carbon materials. Nisshinbo Chemical Inc., the core company of Nisshinbo Group, has two key departments which develop products based on carbon materials. The Carbon Department develops equipment and methodologies based

on glass-like carbon technology. After processing carbon materials using the department's own advanced purification technology, the resultant materials are mainly used for semiconductor production devices. The Fuel Cell Department creates carbon-resin composite technology for moulding carbon bipolar plates. With the Nisshinbo Group's excellent mass production technology, their products are widely used in and have improved the reliability of domestic fuel cell systems in Japan. Nisshinbo, the company with the environment in mind, is strengthening its collaborative research with Gunma University to better enable the practical use and commodification of carbon materials. ■