Team develops highly active catalyst for alkaline water electrolysis using boron and sulfur

July 20 2023

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Development of hydrogen-related technologies is essential to realize and sustain a carbon-neutral society. Hydrogen is obtained from water electrolysis; however, the existing catalysts are made of rare and expensive metals. A research group led by the University of Tsukuba has

developed a novel and highly active catalyst for water electrolysis using boron and sulfur, which are abundant and inexpensive.

Society must reduce the utilization rate of fossil fuels and use renewable energy generated using solar and wind power efficiently to achieve a carbon-neutral society, where greenhouse gas emissions and absorption are balanced. Moreover, hydrogen (green hydrogen) obtained from water electrolysis using renewable energy is crucial for reducing the environmental impact.

Electrode catalysts promote oxygen evolution reactions to make water electrolysis efficient. Currently, rare and expensive precious metals, such as ruthenium and iridium, are used for the fabrication of electrocatalysts. However, novel electrocatalyst materials that utilize more abundant and less expensive elements must be developed in a bid to ensure the sustainable development of our society.

The research group led by the University of Tsukuba has previously reported the synthesis of rhombohedral boron monosulfide (r-BS), comprising boron and sulfur in a 1:1 composition ratio and having abundant reserves, as a potential material for fabricating such a novel electrocatalyst material.

In this study, published in *Chemical Engineering Journal*, the research group has successfully synthesized r-BS + G (i.e., r-BS complexed with graphene nanoplatelets which are sheet-like carbon). Furthermore, it served as an electrocatalyst for water electrolysis in alkaline aqueous solution and exhibited high catalytic activity for the oxygen evolution reaction. It is assumed that this catalyst can be used in practical green hydrogen production system upon further enhancement in its catalytic activity.

More information: Linghui Li et al, Boron monosulfide as an

electrocatalyst for the oxygen evolution reaction, *Chemical Engineering Journal* (2023). DOI: 10.1016/j.cej.2023.144489

Provided by University of Tsukuba