

Section of Public Affairs	Mi-Yeon Kim Section Chief (+82) 62-715-2020	Nayeong Lee Senior Administrator (+82) 62-715-2024
Contact Person Regarding Article	Professor Yunho Lee School of Earth Sciences and Environmental Engineering (+82) 62-715-2468	
Release Date	2018.06.21	

Professor Yunho Lee’s joint research team develops eco-friendly and highly efficient water treatment technology using iron oxide

- Korean researchers in conjunction with international researchers have developed an eco-friendly, high-efficiency water treatment technology using ferrate *.

* Iron salts use divalent or trivalent, which is a hexavalent iron salt lacking six electrons.

- GIST (President Seung Hyeon Moon) – Professor Yunho Lee of the School of Earth Sciences and Environmental Engineering worked with Professor Allard of Curtin University in Australia to use iron-based environmentally friendly oxidizing agents to treat water containing iodine ions to develop high-efficiency water treatment technology that can produce safe drinking water without toxic byproducts.
- Fertilizer is much more powerful than hydrogen peroxide because it oxidizes organic substances and at the same time coagulates and precipitates. Therefore, it is effective in wastewater treatment and is very effective in removing chromaticity and odor because of its strong oxidizing power.

- Iodine ions (I-) are present in high concentrations in the water of many countries, including Australia, because iodine disinfection byproducts (I-DBP) with high toxicity react with the chlorine used in the water treatment process, * posing a major obstacle to securing safe drinking water.

* When water containing iodine ions is disinfected with chlorine, it is the most toxic among chlorine disinfection by-products.

- The researchers discovered that ferrate oxidizes iron iodide in hexavalent oxidation state to iodine trioxide (IO₃-), which is harmless to the human body.

- Ferrate is capable of oxidizing various contaminants and pathogenic bacteria, and iron of the trivalent form produced after ferrate reaction can additionally remove various kinds of contaminants through coagulation-precipitation, making it is possible to produce safe drinking water without any problem.

- This study was conducted at the request of Dr. Allard's team in Australia, which had difficulty in producing clean water due to the presence of iodine ions in groundwater. Professor Yunho Lee's postdoctoral researcher Jae-don Shin visited Curtin University's Food Water Quality Research Center and conducted some of the research. Professor Reckhow (USA, University of Massachusetts at Amherst) and von Gunten (Switzerland, EPFL, Eawag and GIST, Professor, School of Earth Sciences and Environmental Engineering), world-renowned experts in the field of food water treatment, participated to identify the complex chemical reaction pathways and mechanism of the oxidized iron and iodine ion species.

- Professor Yunho Lee said, "This research will contribute to solving the problem of drinking water in water-scarce regions by presenting new technology using the environmentally friendly, high-efficiency water treatment using ferrate, and it can contribute to the development of environmental technology and solve social problems through an understanding chemical reaction."

- This research was led by Professor Yunho Lee (corresponding author) of GIST and Dr. Jae-don Shin (first author) and was supported by GIST GRI and the National Research Foundation of Korea. The research results were published online on June 1, 2018, in *Environmental Science & Technology*, a prominent international scientific journal in environmental science.

