Q-AOS 九州大学 アジア・オセアニア研究教育機構 ブラウンバッグセミナー

Brown Bag Seminar No.176

2025 2.12 (wed.) 12:10 ~ 12:50

12:10-12:15	◆ Introduction
12:15-12:40	◆ Seminar (Presentation)
12:40-12:50	◆ Q&A

Online (Zoom)

Scan here for Registration

https://us02web.zoom.us/webinar/register/WN_1f0Wk2Z7R0Wm20WWOU_47Q

Supported by Kyushu University,Q-AOS

Low-temperature plasma applications to achieve sustainable development goals

2 ZERO HUNGER

Key Words

Low-temperature plasma

Nitrogen fertilizer

Sustainable development

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Dr. Pankaj Attri has been serving as an Associate Professor (special project) at Kyushu University, Japan, since 2019. He earned his Doctor of Science (D.Sc) from Kyushu University and his Ph.D. in Chemistry from Delhi University, India. Prior to his current role, he was an Assistant Professor at Kwangwoon University, Korea, from 2013 to 2017. Dr. Attri has received notable fellowships, including the Japan Society for the Promotion of Science (JSPS) Invitation Fellowship at Kyushu University and the Marie Skłodowska-Curie Actions Individual Fellowship at Antwerp University, Belgium. His scholarly work is well-regarded, with over 150 publications, 10 book chapters, and 8 patents to his name, and he has garnered over 7500 citations. Dr. Attri also contributes to the scientific community as an Editorial Board Member for Scientific Reports and Magnetochemistry and serves as a Guest Editor for various other journals. Stanford University Researchers have recognized his exceptional contributions to science and have listed him five times since 2017 in the world's top 2% of scientists.

Soil fertility management is vital for farmers, especially as the demand for food continues to rise. Over the past 50 years, the use of synthetic nitrogen (N) fertilizers has increased 20-fold to meet the needs of our growing population. To promote sustainable agricultural productivity, nitrogen fixation using plasma technology has gained significant attention. This method produces nitrogen fertilizer from air, water, and electricity, offering a more environmentally friendly alternative to the traditional Haber-Bosch (H-B) method, which relies on fossil fuels and generates CO_2 emissions. In our research, we synthesized ammonium nitrate using low-temperature plasma, without the need for hydrogen or external catalysts. We then used this plasma-enriched soil to grow various plants, including radishes, tomatoes, and sugarcane. The results demonstrated that the plasma-enriched soil significantly enhanced plant growth. Additionally, we conducted one-dimensional (1D) and two-dimensional (2D) simulations using COMSOL Multiphysics® software to analyze the reactions that produced gas-phase compounds during the process.