第480回触媒科学研究所コロキウム

Precise catalyst design toward hydrogen production with zero CO_2 emission

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2025年4月23日（水）10:45—11:45

（創成科学研究棟　5階　大会議室）

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Abstract

Carbon-neutral hydrogen production is of key importance for the chemical industry of the future. In this take I will demonstrate a new thermal catalytic route for the partial reforming of ethanol into hydrogen and acetic acid with near-zero carbon dioxide emissions. This reaction is enabled by a catalyst containing a high density of atomic Pt_1 and Ir_1 species supported on a reactive alpha-molybdenum carbide substrate, achieving record-high hydrogen production rate and high acetic acid selectivity in mild condition, and is therefore more energy-efficient compared with standard reforming. This innovation aligns with global decarbonization goals, offering a scalable pathway for green hydrogen and circular chemical production.

Biography

Mi Peng is currently an associate research fellow in the College of Chemistry and Molecular Engineering at Peking University. He obtained his B.S. in Materials Chemistry from Peking University in 2016, as well as Ph.D. (2021) in Physical Chemistry with Prof. Ding Ma. After working with Prof. Ma as a postdoctoral researcher (2021–2023), he got the current position as an associate research fellow. He has published over 60 peer-reviewed papers with more than 5,000 citations. His current research interest is focused on catalytic process within the life cycle of hydrogen, encompassing production, storage, and utilization, specializing in catalyst design and characterization in alcohol reforming, liquid organic hydrogen carrier (LOHC) conversion, and ammonia cracking.

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