



Atomically Dispersed Metal Catalysts Steering Selective Electrocatalysis

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Invited Lecture

Date & Time: *Thursday, Sept. 4, 2025; 11 a.m. to 12:30 p.m*

Place: *Seminarraum 2, 1. Stock, Währinger Straße 42*

Host: *Univ.-Prof. Dr. Freddy Kleitz*

Electrocatalysis is a key driver in promoting the paradigm shift from the current fossil-fuel-based hydrocarbon economy to a renewable-energy-driven hydrogen economy. The success of electrocatalysis hinges primarily on achieving high catalytic selectivity along with maximum activity and sustained longevity. Important electrocatalytic energy conversion reactions are often constrained by the scaling relationship, which sets the intrinsic limitation in designing highly selective and active electrocatalysts. In this seminar, I present our recent endeavours for designing carbon-supported atomically dispersed metal (M–N/C) catalysts [1] that promote selective electrocatalysis of four-electron ($4e^-$) vs. $2e^-$ oxygen reduction reaction [2] and chlorine evolution reaction (CER) over parasitic oxygen evolution reaction (OER) [3].

References

- [1] Kim, J. H. *et al. Acc. Chem. Res.* **2022**, *55*, 2672–2684.
- [2] Sa, Y. J. *et al. J. Am. Chem. Soc.* **2016**, *138*, 15046–15056; Ko, M. *et al. Nat. Commun.* **2019**, *10*, 5123; Ko, M. *et al. Nat. Catal.* **2022**, *5*, 37–44.
- [3] Lim, T. *et al. Nat. Commun.* **2020**, *11*, 412; Lim, T. *et al. ACS Catal.* **2021**, *11*, 12232–12246; Cho, J. *et al. Nat. Commun.* **2023**, *14*, 3233; Kim, J. *et al. Angew. Chem. Int. Ed.* **2025**, *64*, e202417293; Kim, J. *et al. J. Am. Chem. Soc.* **2025**, *147*, 27664–27675.

Biography: Prof. Sang Hoon Joo ()

Sang Hoon Joo is a Professor of Chemistry at Seoul National University (SNU). He completed his undergraduate degree in chemistry at KAIST (1998) and received his Ph.D. degree under the guidance of Prof. Ryong Ryoo at KAIST (2004). After an industrial stint as a Member of R&D Staff at SAIT, Samsung Electronics Co. (2004–2007), he moved to the University of California, Berkeley as a postdoctoral researcher, working in the group of Prof. Gabor Somorjai (2007–2009). Before joining the SNU faculty in 2023, he was a Professor of Chemistry at UNIST (2010–2023). His group

focuses on the design of advanced electrocatalytic materials for activating small molecule transformation reactions that are relevant to renewable energy conversions and commodity chemical productions. He has published more than 200 papers that have been cited more than 32,500 times with an h-index of 80 (Google Scholar) and holds 52 issued patents. He is a member of the Young Korean Academy of Science and Technology (Y-KAST, 2018) and has received several awards, including the KCS Sigma–Aldrich Chemist Award (2022), the KECS Academic Excellence in Fuel Cells Award (2022), the S-Oil Next Generation Scientist Award (2021), the KICChE Catalysis and Reaction Engineering Division Young Catalysis Scholar Award (2017), the KCS Materials Chemistry Division Excellent Research Award (2016), the Creative Knowledge Award (2011), and the TJ Park Junior Faculty Fellowship (2010). He currently serves as an Associate Editor of *ACS Appl. Mater. Interfaces* and a member of Advisory/Editorial board of *Electrochim. Acta* and *Nano Express*.