

ICB PhD public presentations**STRUCTURE-PERFORMANCE
RELATIONSHIP OF Pt/CeO₂
CATALYSTS FOR THE WATER-GAS
SHIFT REACTION****Xiansheng Li**

The van Bokhoven Group / Paul Scherrer Institute

Supervisors: Prof. Dr. Jeroen A. van Bokhoven
and Dr. Luca Artiglia

Co-examiner: Prof. Dr. Christoph Müller



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OFLG/402 and on Zoom
(<https://ethz.zoom.us/j/64576007382>)**

Project Summary: The water-gas shift (WGS) reaction is a crucial industrial process used to produce hydrogen for applications such as steam reforming, ammonia synthesis, and fuel cells. This reaction is also of significant interest in fundamental catalysis research. Supported noble metal catalysts are among the most extensively studied catalysts for WGS. However, determining the exact active site and operating reaction mechanism on these catalysts is still a matter of debate due to the complexity of the experimental catalyst system. There have been disagreements regarding whether the active site is atomically-dispersed (AD) ions or small nanoparticles (NPs).

This work aims to resolve these debates by characterizing the structural evolution of AD and NP species in different environments, quantitatively comparing their reactivity towards WGS, investigating the effect of alkali modification, and proposing a reaction mechanism for WGS on Pt/CeO₂ catalysts using in situ/operando spectroscopic methods. By doing so, this work sheds light on the structure-performance relationship study of real-world catalysts under industry-relevant conditions.

CV: Xiansheng Li earned his master's degree with honors from Tsinghua University in 2018. Since then, he is pursuing his doctorate under the supervision of Luca Artiglia and Jeroen A. van Bokhoven in the van Bokhoven Group.