Using Canadian Light Source Synchrotron for Catalysis Studies
(Abstract)

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CO_2 reforming of CH_4 plays important roles in the development of clean coal technology, renewable energy production, and biomass utilization. However, a viable (active, stable, and economical) catalyst is a must to facilitate this reaction. Ni-based catalyst is one of the most promising catalyst candidates but a long-term problem for this kind of catalyst is its tendency to be deactivated by carbon formation. With efforts in catalyst design and trials in performance tests, we have had a Ni-Co/MgAlOx catalyst which can minimize the carbon formation such that the CO_2 reforming of CH_4 reaction can be operated over the catalyst for 2000 h with high activity and selectivity. Canadian Light Source (CLS) synchrotron provides spectroscopic tools for in-depth understanding of catalytic phenomena during the reaction, which helps answer the following questions: 1) Is the catalyst preparation method developed the sole one to synthesize the right catalyst material? 2) How to formulate the active metallic nanoparticles in the right size during catalyst reduction? 3) What roles does the second metal Co play during the formation of metallic nanoparticles? 4) Has Ni-Co alloy formed during catalyst reduction?

Brief Bio of Dr. Hui Wang

Dr. Hui Wang is a professor in the Department of Chemical and Biological Engineering of the University of Saskatchewan. He received his BSc and MSc from Taiyuan University of Technology and PhD from University of Alberta. With experience working in industry, universities in China, Australia and Canada, and a US national laboratory, Dr. Wang's expertise covers heterogeneous catalysis, separation engineering, chemical reaction engineering, and synchrotron X-ray absorption spectroscopy studies in catalysis. He has participated in the projects of developing carbonyl sulfide hydrolysis catalyst, H_2S scavenger and sulfur removal technology. The method he and his co-workers developed to make CO_2 reforming of CH_4 catalyst, which allows long-term stable operation by minimizing the carbon formation side reaction, has been awarded a US patent. Dr. Wang and his group are also investigating hydrogen production from splitting H_2S, mercury capture using cheap adsorbents, and catalytic combustion efficiency. Dr. Wang has authored and co-authored over 100 publications including refereed journal papers, book chapters, patent, invited and keynote lectures, etc. He is the recipient of the Award of Innovation from the Innovation Place of City Saskatoon and the Industrial Liaison Office of University of Saskatchewan. He is the Secretary and Treasurer of the Catalysis Division of the Chemical Institute of Canada.