Prospects on the application of PEM fuel cell system in China

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PEM fuel cell is one of the most attractive fuel cell technologies in the new century. Fuel cell will change the structure of energy supply in the world because of its need not depend on the fossil fuel, such as petroleum, natural gas, and so on. Due to the promising prospect of fuel cell technology, more and more universities, institutes and companies have been involved in the R&D activities of PEM fuel cells in China since 1990. Here, the outline of the main R&D activities and application potential for the PEM fuel cell technology in China was reviewed.

The United Nation Development Program (UNDP) was the first promoter for the demonstration of fuel cell in China. Ministry of Science & Technology (MOST) of China initiated a project named the study of commercialization of fuel cell powered bus in China under the grant support from UNDP in 1996. As one of active members for this project, I visited Ballard, Siemens, Daimler-Benz, GM, H Power, Allied-Signal, LANL, ANL in 1997. We contacted many fuel cell scientists during the study tour, and finished one feasibility report on the commercialization capacity for fuel cell powered bus in China. As a result of this project and study tour, China government made a decision to start the national key research program on fuel cell technology during the ninth five-year plan in 1998. The goal of the key program was to finish one fuel cell electric vehicle. It was performed by Dalian Institute of Chemical Physics (DICP), Chinese Academy of Science (CAS) and some of institute in CAS. Some companies were also involved. Some of the groups in the universities were granted from Natural Science Foundation (NSF) of China for the basic science research on the fuel cell system, especially on the PEM fuel cell system.

The R&D activities for the PEM fuel cell include the demonstration and the key materials. The demonstrations of the PEM fuel cell system were performed in the industrial. The most active members involved this activities are Beijing Fuyuan-Century Fuel Cell Inc., Dalian Sunrise power system Inc, one of subsidiary of DICP, God's Power High Tech Co. Ltd/Shanghai) and Beijing Green Energy Inc. The PEM fuel cell stacks were demonstrated within these companies ranging from 50w~30kW. The powerful force to promote the PEM fuel cell technology in China was the fuel cell powered vehicle plan which granted by MOST in December, 2001. The goal of this key project would introduce a FCEV fleet during the Beijing Olympic 2008. The key materials for PEM fuel cell system should be solved before its commercial application worldwide. The MOST and NSF in China offered financial support to universities and institute at CAS for this field.

Department of Chemical Engineering at Shanghai Jiao Tong University has been working on the new materials for PEMFC since 1998. The rare earth based electrocatalyst preparation technology and non-fluorinated membrane were finished in our group. Tsinghua University, Wuhan University, Petroleum University (Beijing), Donghua University, Tianjin University, and Institutes in Chinese Academy of Sciences (CAS) such as Dalian Institute of Chemical Physics (DICP), Chanchun Applied Chemical Institute, Shanghai Organic Chemistry Institute, Shaxi Coal Chemical institute.

Some industrials are involved recent year. The companies included Suzhou Machine (Holding) Co.Ltd, Shanghai Auto Industrial Co. (SAIC), Dongfeng Auto Co. etc.

According to the program mentioned above, we think it will promote the commercial application of PEM fuel cell system in China.

Acknowledgements
This work supported by the Natural Science Foundation of China under approval No.20076026.