FS3-7 Present Status of SOFC Research and Development at INER

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Abstract

Solid oxidation fuel cell (SOFC) is identified as an emerging clean primary source with high efficiency, and flexibility. As it can be modular, configured and sized to meet the local power generation demand, SOFC system has very attractive potential for the market of distributed and base-load stationary power generations. Furthermore, SOFC system is considered as one of the essential technological ways of bridging from fossil fuel to hydrogen economy in the near future.

In Taiwan, the energy self-sufficiency is less than 2%, however the power demand is still progressively increasing to comply with the requirements from civil and industrial uses. Attributed to the environmentally friendly and higher efficiency of the SOFC, INER has been commissioned on the SOFC R&D work since 2003. The long-term target has been set to the coal based central generation and large demonstration system. For the short-term target, the Institute is to establish the 3~5 kW SOFC distributed power generation system in a few years.

To fulfill the goal, both software and hardware capacities are being built up stepwise. In the INER's SOFC project, planar configurations with anode-supported cells have been currently designed and demonstrated. Key materials for the MEA are being developed by tape casting, laminating, screen printing, atmospheric plasma spraying and other innovative processes. Modules for the cell and stack test stations (100W~2kW) are being built up to execute the cell/stack performance tests. As to modeling and simulation, the STAR-CD with es-SOFC package and fluid/structural coupling interface code PATRAN and structural code MARC are employed to simulate the behavior of the cell and stack. Results of simulations can be validated by the experimental data in order to optimize the SOFC stack design. Versatile joined projects are incorporated with domestic companies and universities to integrate our efforts with industries and academics in Taiwan. International cooperative projects are progressing intensively as well. A 1kW SOFC demonstrative system will be expected to operate at INER shortly.