

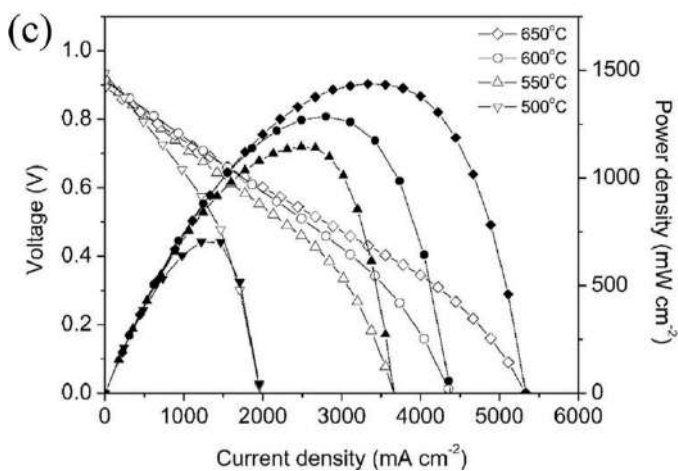
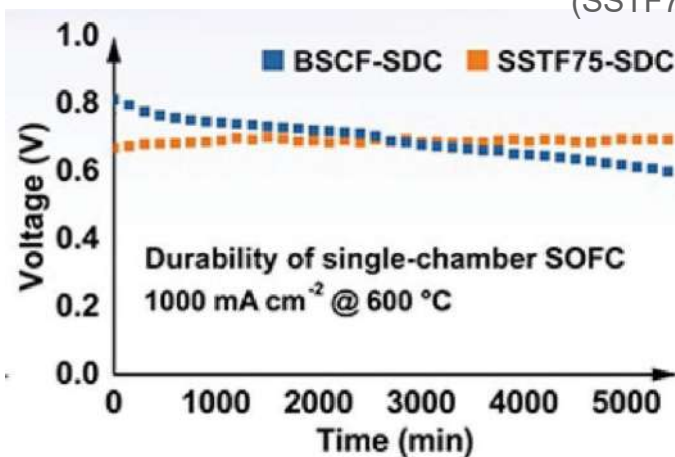
Energy Conversion through Durable Single Chamber Solid Oxide Fuel Cell

高性能和工作穩定的單腔固體氧化物燃料電池

Prof. Meng Ni, Professor, Department of Building and Real Estate

Special features 技術特點

- ▶ Higher fuel cell efficiency (>50%)
更高的燃料電池效率 (>50%)
- ▶ Stable in CO₂-rich environment
在富含二氧化碳的環境中穩定性高



High performance and durable single chamber solid oxide fuel cells (SC-SOFCs) are developed for efficient energy conversion at 500-700°C. The cathode is the key to realize the efficient and durable operation of SC-SOFC, as typical cathode materials degrade significantly in a CO₂-rich environment. Cobalt-free novel perovskite oxide materials SrSc_{0.075}Ta_{0.025}Fe_{0.9}O_{3-δ} (SSTF75) are fabricated as SC-SOFC cathode. The

materials showed excellent activity (very low resistance) towards oxygen reduction reaction (ORR) and high resistance to CO₂. SC-SOFC demonstrated excellent stability in CO₂ environment and delivered high power density of over 1.4W/cm² at 650°C, exceeding the performance of existing SC-SOFCs.

The SC-SOFCs can be used for combined heat and power co-generation, a backup power source for vehicles and various stationary applications. It can make significant contribution to sustainable energy conversion.

傳統的雙腔固體氧化物燃料電池結構較複雜及昂貴，往往因電池陰極材料在富含二氧化碳環境中迅速失活，導致其性能迅速衰減。理大團隊就此開發了不含鈷的鈣鈦礦氧化物新材料用作單腔固體氧化物燃料電池之陰極，新材料具有極好的氧還原催化活性，以及在二氧化碳環境中有優秀的穩定性，能應用於攝氏500至700度間的環境中。此單腔固體氧化物燃料電池在650度的溫度獲得了超過1.4瓦的功率密度，可應用於熱電聯產，為汽車提供後備電力，或其他各種固定式的發電設備。



Contact Us
Ir Steven Lam, Manager
Innovation and Technology Development Office
T (852) 3400 2864
E steven.tf.lam@polyu.edu.hk



www.polyu.edu.hk/itdo