

Application 2045



Optimising Scandia-stabilised Zirconia SOFC

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Conventional Nickel-Yttria Stabilised Zirconia (Ni-YSZ) is the most developed and most commonly used anode because of its low cost and exceptional performance in H₂ rich environments but under hydrocarbon operation, Ni-YSZ can deteriorate significantly due to low sulphur tolerances and carbon deposition. Developing SOFC systems that suppress coking and operate in lower temperature regimes improves system stability, lowers materials degradation. SOFCs based on Scandia-Stabilised Zirconia (ScSZ) are better suited than Yttria-Stabilised Zirconia (YSZ) for use in low to intermediate temperature applications due to their higher conductivity values when compared against all of the suitable Zirconia dopants and the effect of Ceria in supporting carbon conversion.

The project proposed here will support the work in Birmingham by

1. offering calibration towards a well established and experienced laboratory; this will allow better judgment of our own results on tailor made test rigs
2. offer the aspect of long-term operation we cannot currently perform on our own equipment

ScSZ SOFC cells manufactured at UoB will be sent to JUELICH for 1000 to 3000 hours of testing under hydrogen and under methane internal reforming conditions. Supporting characterisation with leak testing will be helpful.

Depending on the results, further experiments with contaminated fuel and under varying conditions supporting carbon formation will be conducted in order to gain supportive data on the performance of the UoB cells.