

Supplementary material

Unraveling the Role of Si and Al Impurities in Ni/YSZ Fuel Electrode Degradation in Solid Oxide Electrolysis Cells

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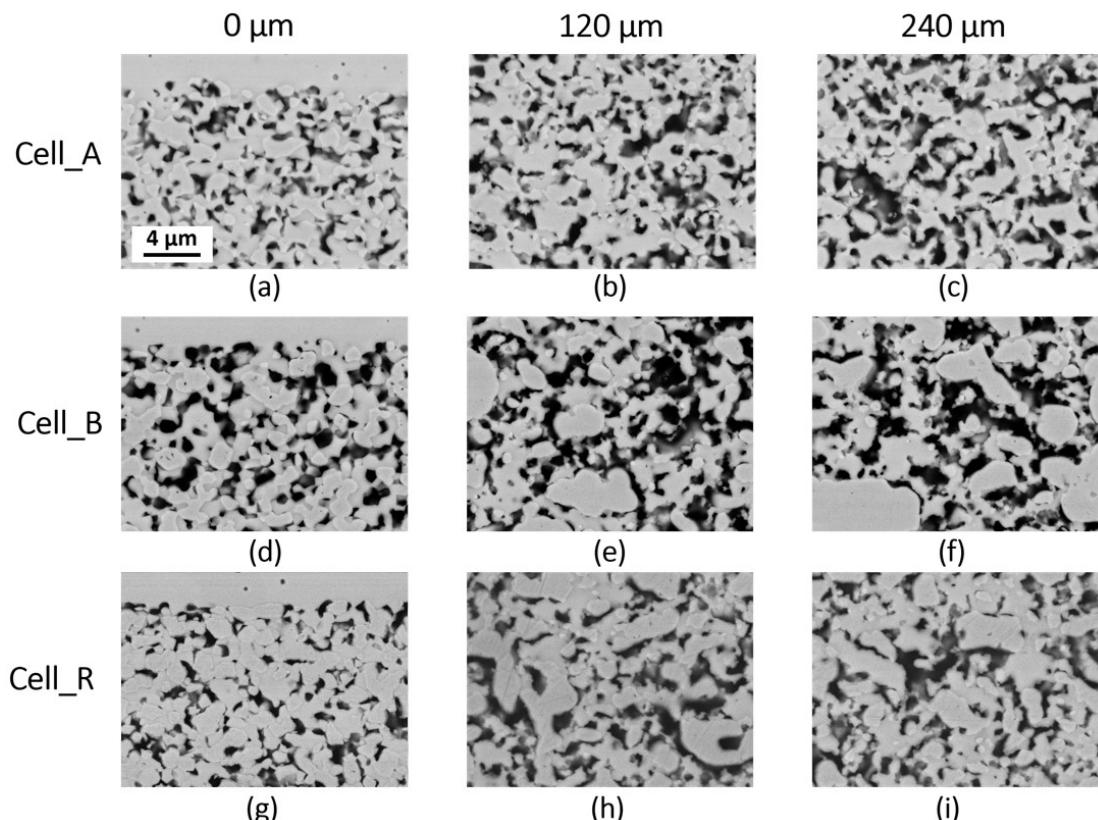


Figure S1. The SEM micrographs of the cross section of (a)-(c) Cell_A, (d)-(f) Cell_B and (g)-(i) Cell_R. All the images were taken at the gas-inlet side of the cells. The locations of the SEM images were recorded at different distance from the electrolyte/electrode interface in fuel electrode: (a, d, g) 0 μm, (b, e, h) 120 μm, and (c, f, i) 240 μm.

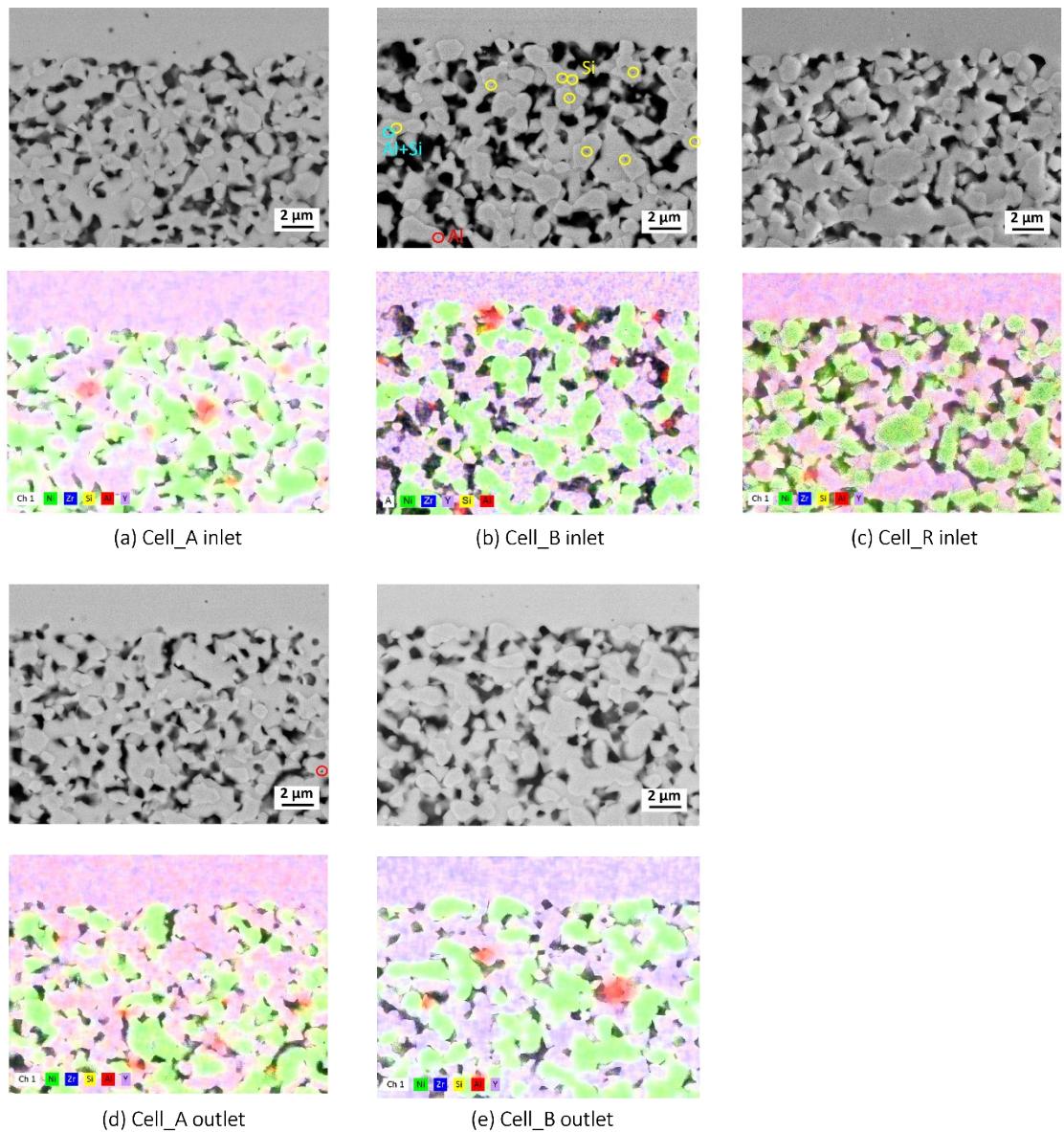


Figure S2. The SEM micrographs, mapping and point analysis of the cross section of Cell_A, Cell_B and Cell_R at gas inlet and outlet. The locations of the SEM images were recorded at the fuel electrode/electrolyte interface.

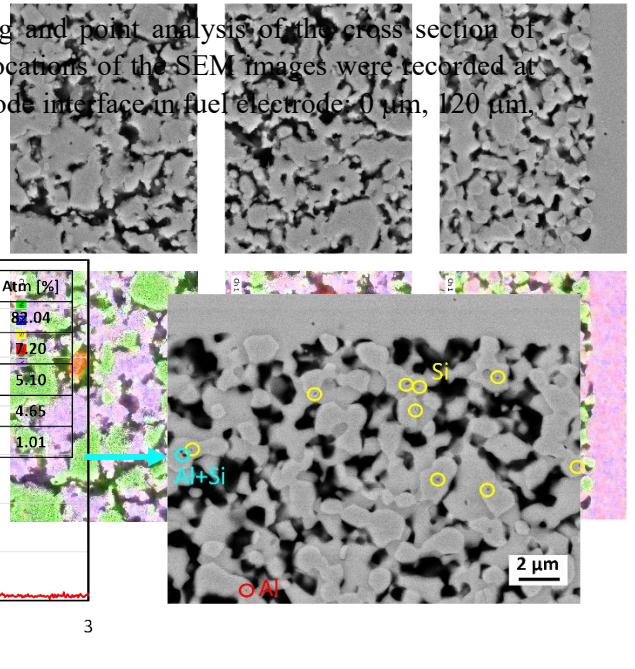
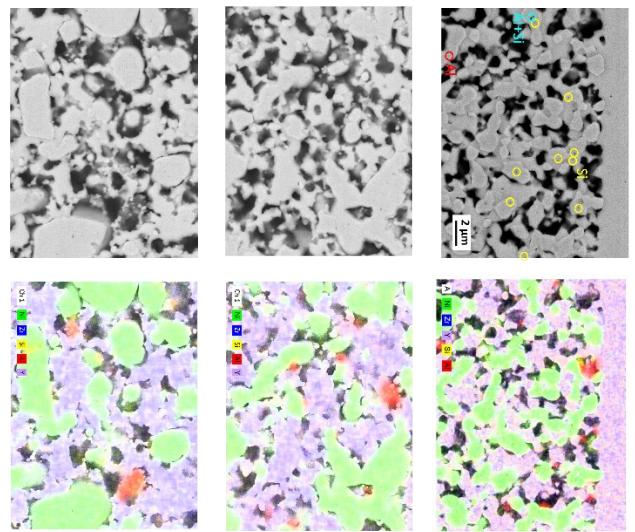
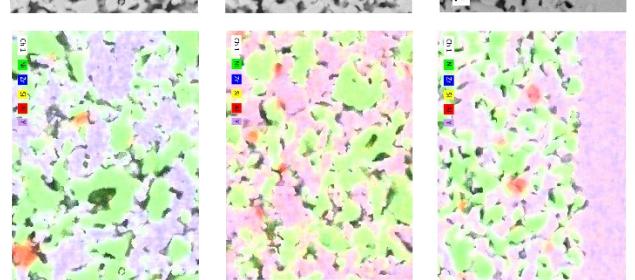


Figure S3. The SEM micrographs, mapping and point analysis of the cross section of Cell_A, Cell_B and Cell_R gas inlet. The locations of the SEM images were recorded at different distance from the electrolyte/electrode interface in fuel electrode: 0 μ m, 120 μ m, and 240 μ m.

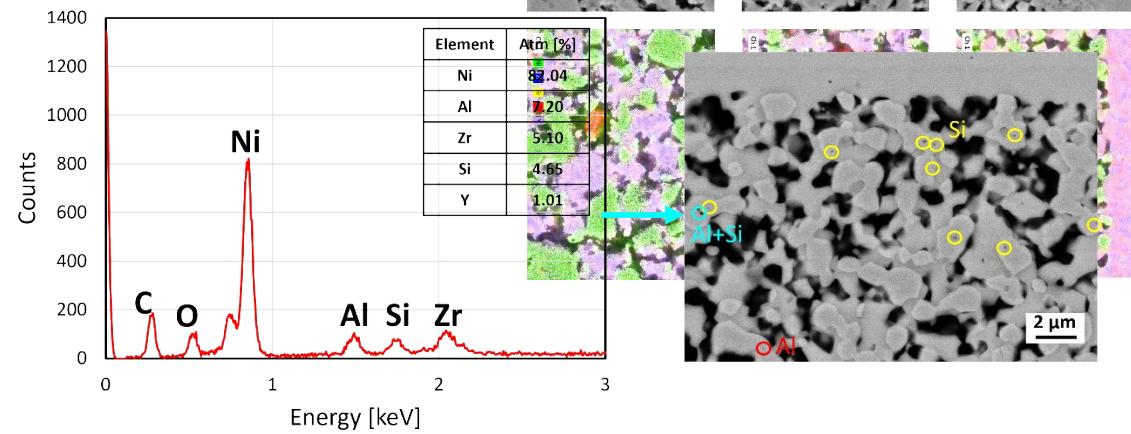


Figure S4. An example of EDX results of point analysis in Cell_B inlet at electrode/electrolyte interface, and the location is indicated on the SEM image.

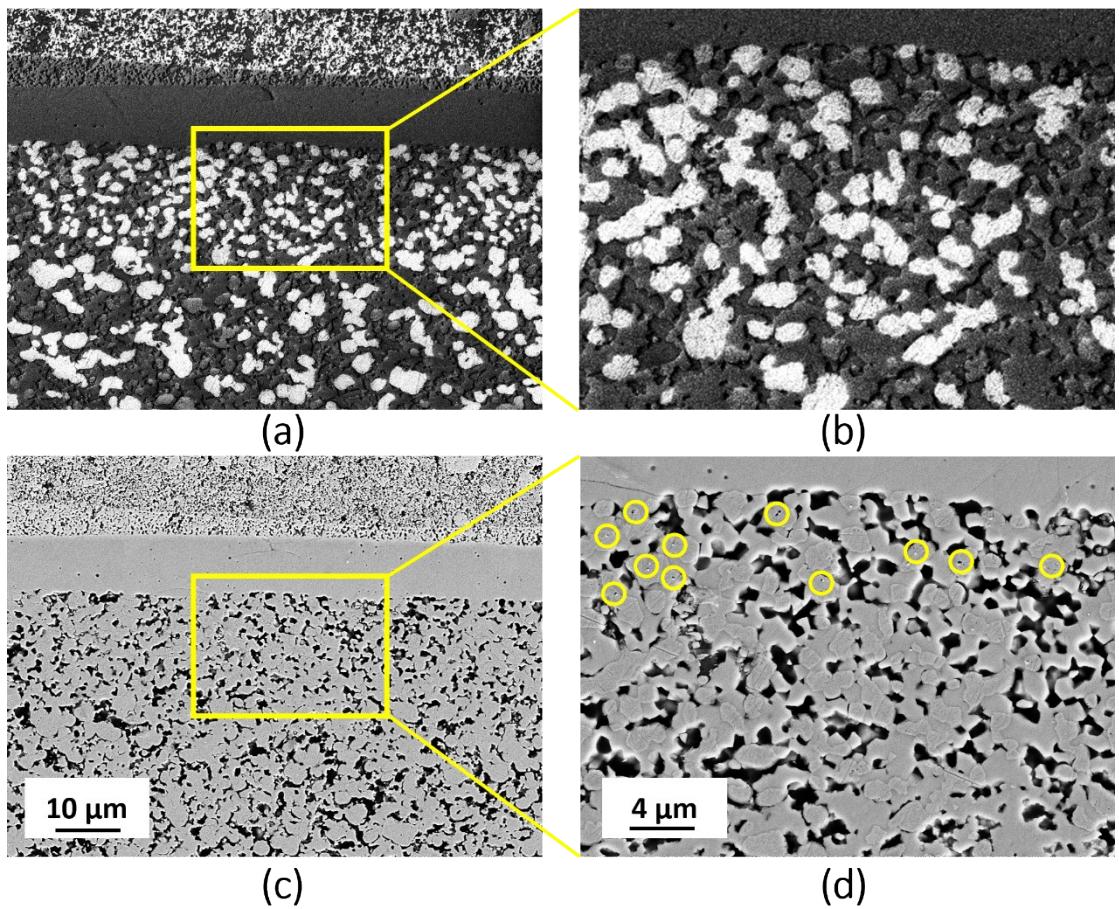


Figure S5. Comparison of percolated Ni images (a-b) and SE2 images (c-d). (b) and (d) are magnified views of (a) and (c), respectively. Yellow circles in (d) indicate locations where Si was detected by EDX analysis.

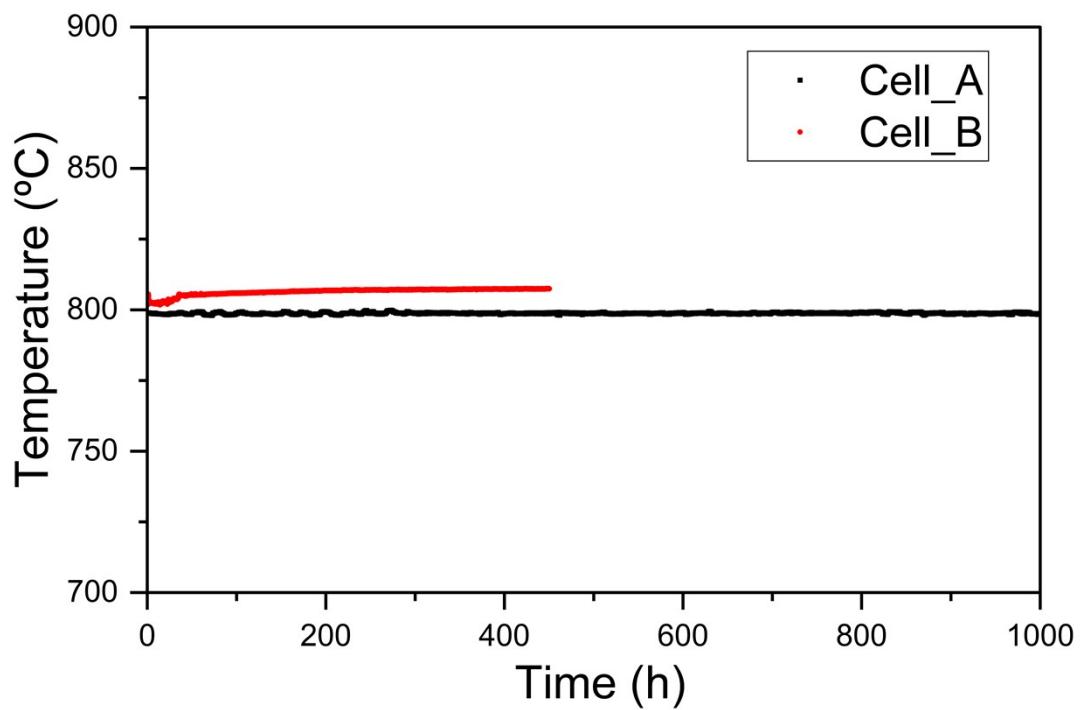


Figure S6. Operation temperature of Cell_A and Cell_B throughout the degradation tests.