Supporting Information

Homogeneous Grain-Controlled ScSZ Functional Layer for High Performance Low-Temperature Solid Oxide Fuel Cells

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Fig. S1 (a) Representative XPS spectra of Zr 3d, Sc 2p and O 1s and (b) XPS depth profile of Zr, Sc O and Si for the fabricated 10 mol% ScSZ thin film grown on Si wafer.
**Fig. S2** SEM micrographs of 100-nm-thick ScSZ thin films deposited on silicon substrate with (a) 40 W, (b) 80 W, (c) 120 W and (d) 160 W of RF plasma power.
**Fig. S3** SEM micrographs of 100-nm-thick ScSZ thin films deposited on (a, d) silicon substrate, (b, e) alumina and (c, f) YSZ substrate with 120 W RF plasma power.
Fig. S4 The experimented and simulated RBS spectra of the ScSZ thin films fabricated under (a) 120 and (b) 160 W RF sputtering power. Argon element is observed in ScSZ thin film grown in 160 W sputtering condition.
**Fig. S5** Ionic conductivity measurement of ScSZ thin films with different RF power condition.
Fig. S6 XRD patterns of ScSZ thin films grown under 120 W power condition on Si wafer before and after annealed with fuel cell operation temperature (450 °C).
Fig. S7 Tafel plots of ScSZ GCL on YSZ pellets with various RF sputtering power.
Fig. S8 Tafel plots of 100-nm-thick ScSZ GCL (120 W) on cathode side of a 500-nm-thick YSZ electrolyte supported by AAO substrate.