Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Supporting information

Table S1 Summary of the reported maximum power density of laboratory SOFC-H with hydrogen as fuel in recent years.

Year	Anode	Electrolyte	Cathode	T (^{o}C)	P_{max} (mW cm^{-2})	Ref.
2005	Pd	$BaCe_{0.8}Y_{0.2}O_{3-\delta}$	Perovskite	600	1400	[S1]
2006	Ni-$BaCe_{0.8}Sm_{0.2}O_{3-\delta}$	$BaCe_{0.8}Sm_{0.2}O_{3-\delta}$	$Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$	700	340	[S2]
2006	Ni-$BaCe_{0.8}Gd_{0.2}O_{3-\delta}$	$BaCe_{0.8}Gd_{0.2}O_{3-\delta}$	$La_{0.5}Sr_{0.5}CoO_{3-\delta}$	700	371	[S3]
2006	Ni-$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.4}Pr_{0.4}Y_{0.2}O_{3-\delta}$	700	270	[S4]
2007	Ni-$BaCe_{0.9}Nd_{0.1}O_{3-\delta}$	$BaCe_{0.9}Nd_{0.1}O_{3-\delta}$	$La_{0.5}Sr_{0.5}CoO_{3-\delta}$-$BaCe_{0.9}Nd_{0.1}O_{3-\delta}$	700	335	[S5]
2008	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$GdBaCo_2O_{5+\delta}$	700	266	[S6]
2008	Ni- $BaCe_{0.9}Y_{0.1}O_{3-\delta}$	$BaCe_{0.9}Y_{0.1}O_{3-\delta}$	$Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$	700	550	[S7]
2008	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$Sm_{0.5}Sr_{0.5}CoO_{3-\delta}$-$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	700	725	[S8]
2009	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$SmBaCo_2O_{5+\delta}$	700	382	[S9]
2009	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$PrBaCo_2O_{5+\delta}$	700	545	[S10]
2009	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.5}Bi_{0.5}O_{3-\delta}$	700	321	[S11]
2009	Ni-$BaCe_{0.7}Zr_{0.1}Y_{0.1}Yb_{0.1}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.1}Yb_{0.1}O_{3-\delta}$	$La_{0.8}Sr_{0.2}Co_{0.2}Fe_{0.8}O_{3-\delta}$-$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	700	1100	[S12]
2010	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$PrBaCo_2O_{5+\delta}$	700	520	[S13]
2010	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$	700	420	[S14]
2011	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Co_{0.2}O_{3-\delta}$	700	370	[S15]
2012	Ni- $BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCe_{0.7}Zr_{0.1}Y_{0.2}O_{3-\delta}$	$BaCo_{0.7}Fe_{0.2}Nb_{0.1}O_{3-\delta}$	700	585	[S16]

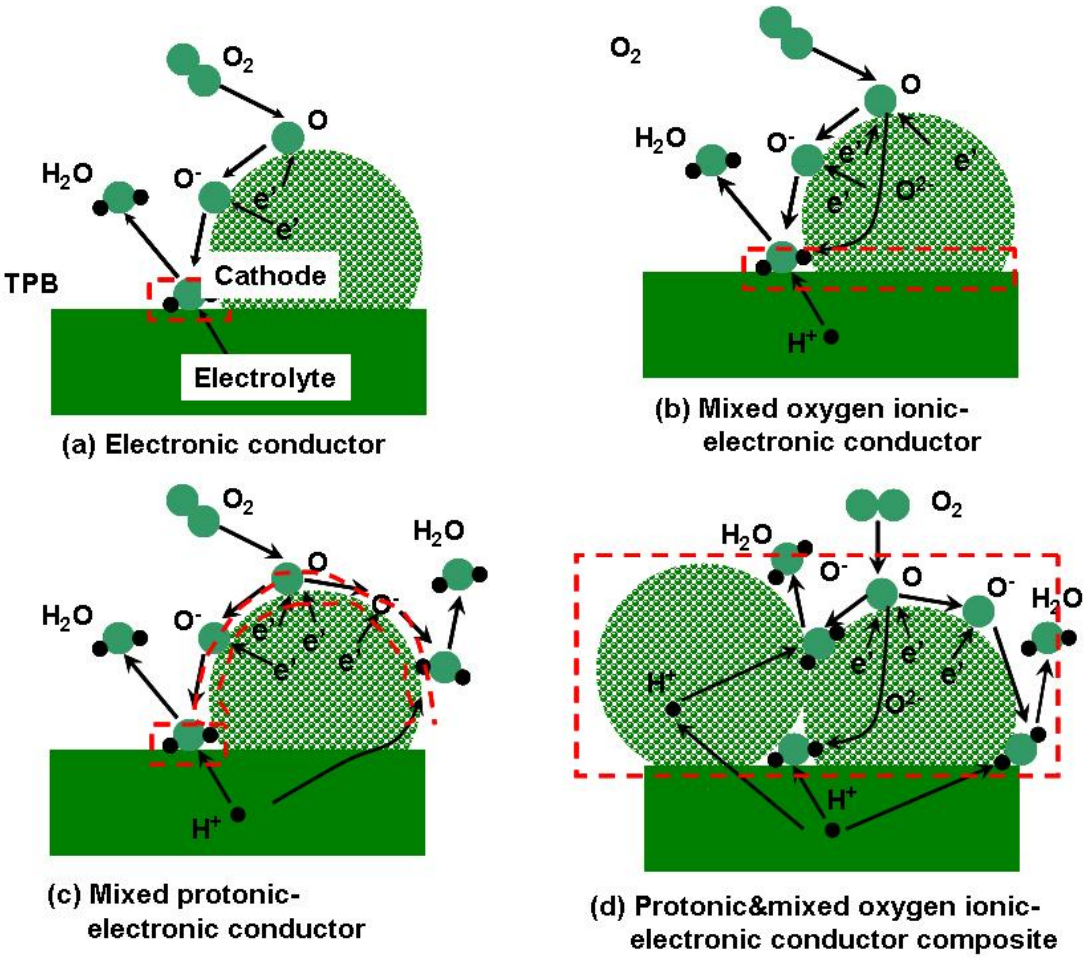

Fig. S1 Reaction mechanism of different cathodes for proton conducting SOFC.

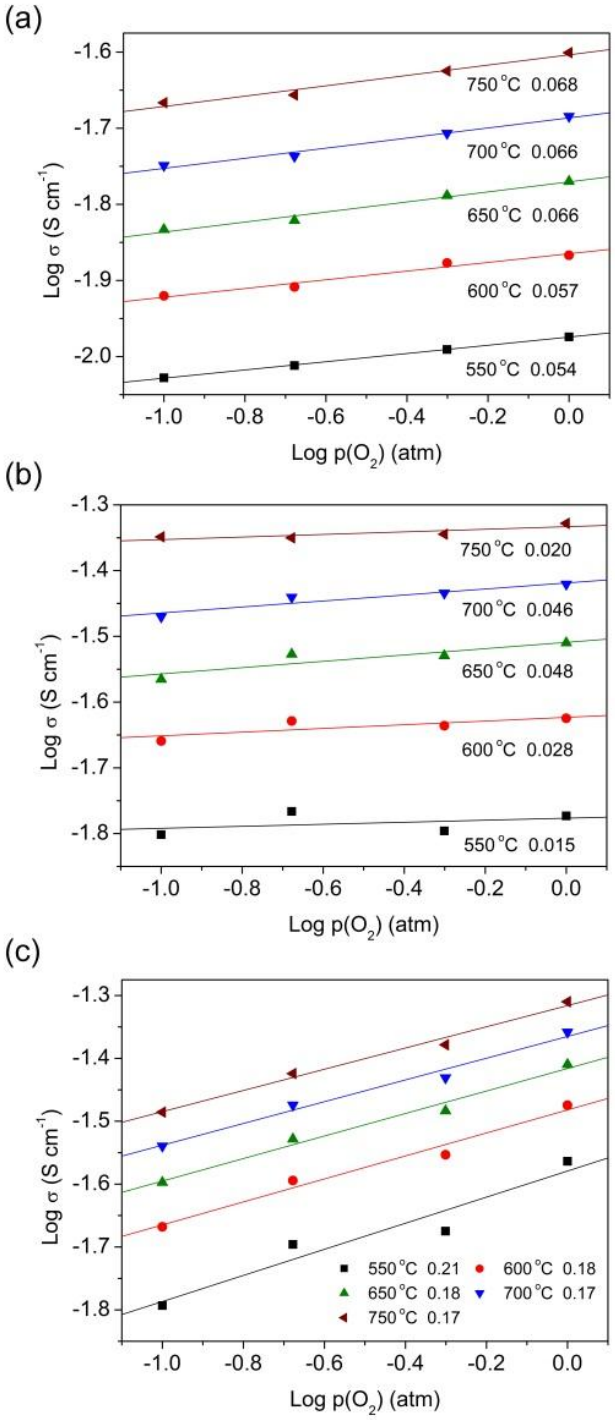

Fig. S2 Dependence of electrical conductivity of symmetrical cell (a), BCS (b) and BCSF (c) on $p(O_2)$. The n values in $\sigma = k\ p(O_2)^n$ are inset.

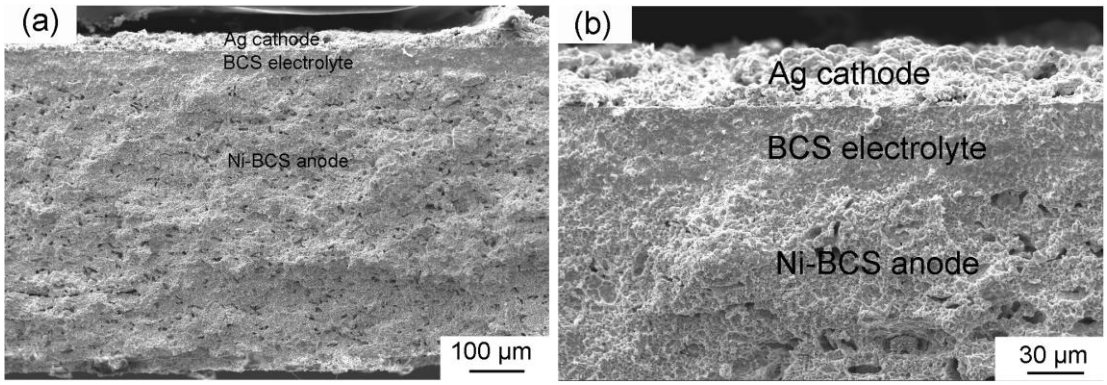

Fig. S3 Microstructure of the Ni-BCS|BCS|Ag cell after test.

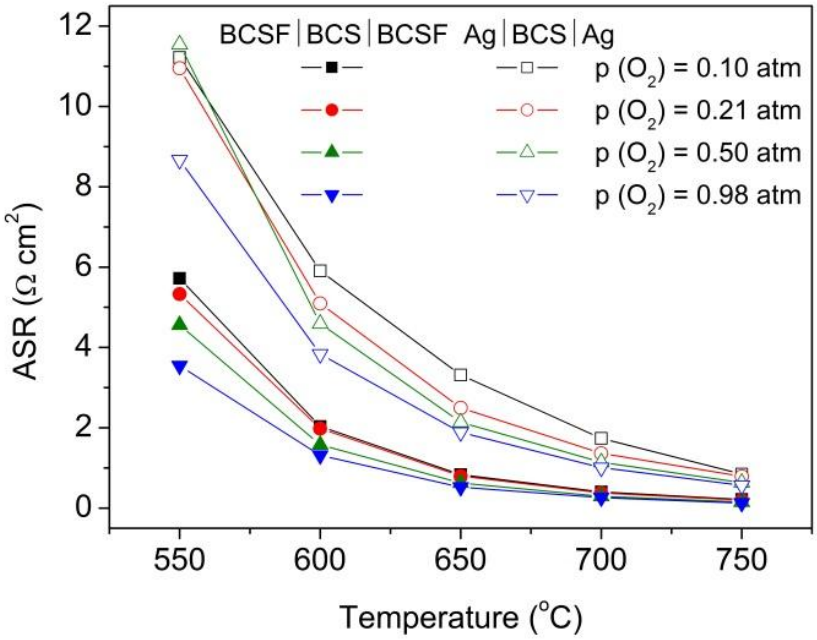

Fig. S4 Comparsion of ASR of symmetrical cells with BCSF and Ag electrode, respectively.

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