Supplementary materials

The output power density of the single cell is closely related to the thickness of the electrolyte. Generally, the single cell supported by anode can have a large output power density, yet a small value when it is supported by electrolyte. In the present work, the single cell is supported by an electrolyte with a thickness of 300 μm, causing a large ohmic resistance. The literature shows that the output performance of the electrolyte-supported SOFC is inversely proportional to the electrolyte thickness. The performance of similar SOFCs reported in the literature is compared. Ma et al. [1] prepared a 30 μm thick YSZ-supported SOFC with a MPD of 526 mW/cm^2 at 800 ℃. Hatae et al. [2] constructed a four-layered anode with a 500 μm thick YSZ-supported SOFC, which reached 140 mW/cm^2 at 800 ℃. Wu et al. tested the YSZ-supported SOFC with an 8 μm thick electrolyte to reach the MPD of 400 mW/cm^2 [3]. The electrolyte thickness in the present work is 300 μm, which leads to a decrease in the MPD. In the future, attempt will be made to improve the performance of NH_3-SOFC.

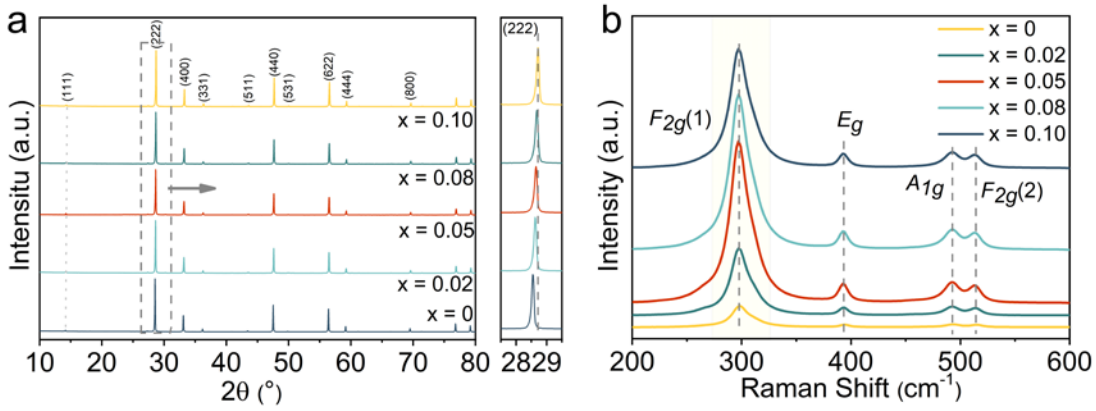

Fig. S1 XRD and Raman spectra.

(a) XRD; (b) Raman spectra of LZN_x powder after calcination at 1200 ℃ for 2 h.

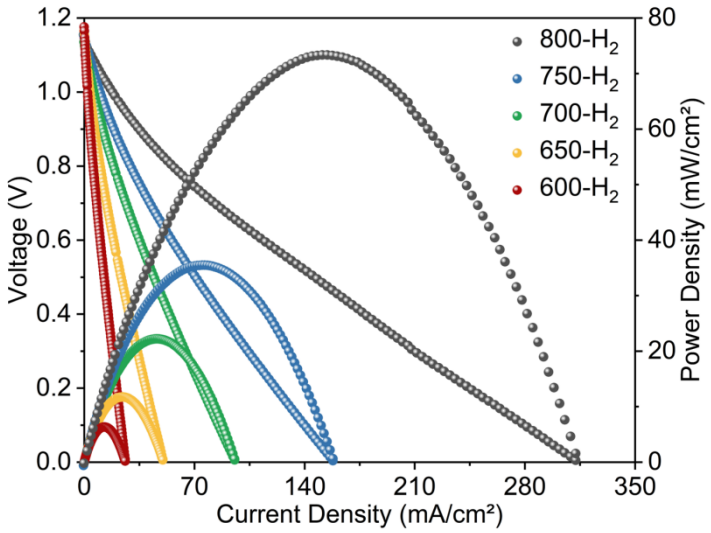

Fig. S2 Performance of the single cell of Ni-YSZ anode in H_2.

References

1. Ma Q, Ma J, Zhou S, et al. A high-performance ammonia-fueled SOFC based on a YSZ thin-film electrolyte. Journal of Power Sources, 2007, 164(1):86–89

2. Hatae T, Kakuda N, Taniyama T, et al. Low temperature preparation and performance of Ni/YSZ anode with a multi-layered structure for SOFC. Journal of power sources, 2004, 135(1–2):25–28

3. Wu P C, Shy S S. Cell performance, impedance, and various resistances measurements of an anode-supported button cell using a new pressurized solid oxide fuel cell rig at 1–5 atm and 750–850 ℃. Journal of Power Sources, 2017, 362:105–114