Supplementary Information for

Evaluation of $((La_{0.60}Sr_{0.40})_{0.95}Co_{0.20}Fe_{0.80}O_{3-x})$-Ag composite anode for direct ammonia solid oxide fuel cells and effect of Pd impregnation on the electrochemical performance

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Supporting Figure

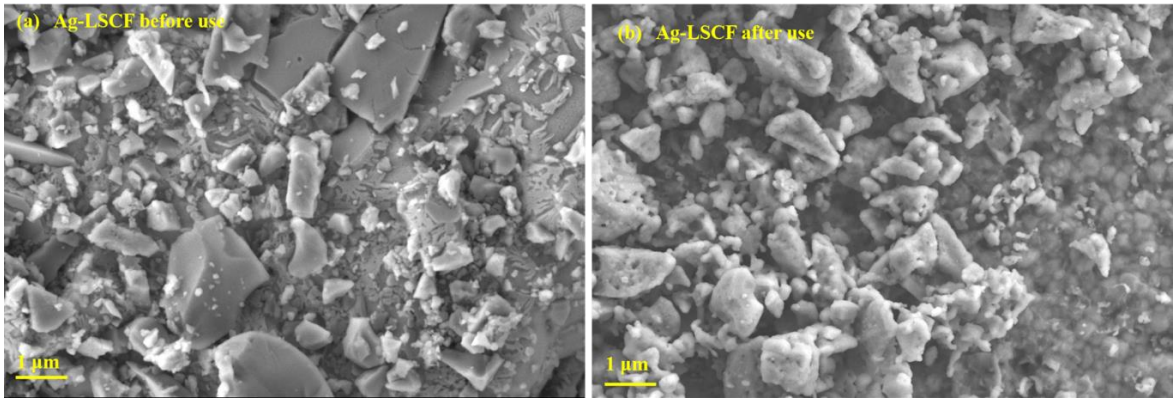

Figure S1. SEM image of Ag-LSCF anode surface as prepared (a) and after cell operation (b).

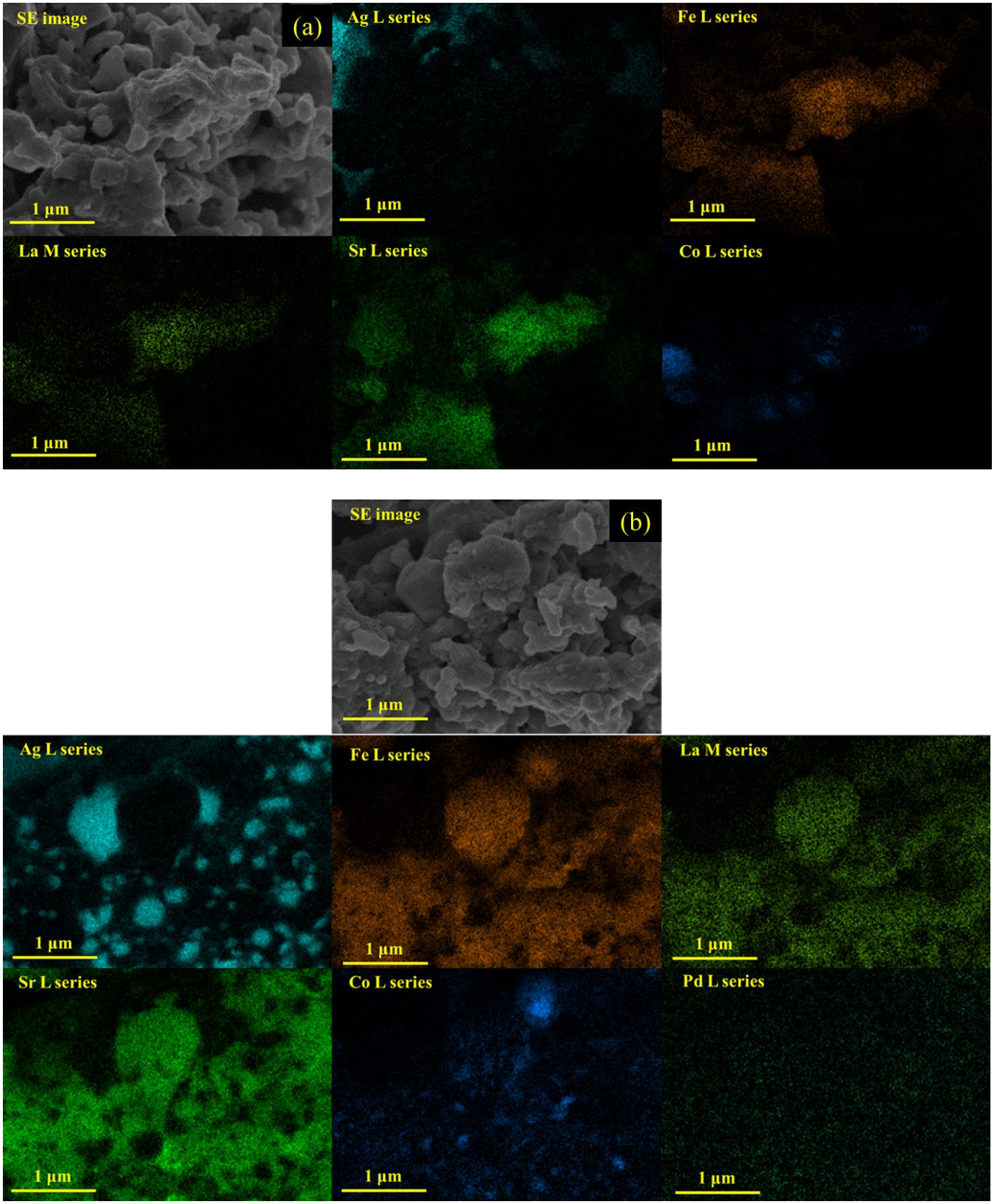

Figure S2. SE image and EDS maps of Ag-LSCF anode after test (a), SEM image and EDS maps for Pd decorated Ag-LSCF anode after test (b).

Table S1. Percentage difference in maximum thermodynamic efficiency of cell with two different ammonia utilisation pathways.

Temperature (°C)	Ammonia utilisation path	Maximum Gibbs free energy available for 1 mole of ammonia (kJ)	% difference in maximum thermodynamic efficiency for ammonia direct electro-oxidation and oxidation of hydrogen produced after complete decomposition of ammonia
700	Ammonia direct utilisation	$\Delta G_{NH_3} = -349.67$	$\frac{\Delta G_{NH_3} - 1.5 \times \Delta G_{H_2}}{1.5 \times \Delta G_{H_2}} \times 100 = 20$
	Ammonia utilisation after complete cracking	$1.5 \times \Delta G_{H_2} = -1.5 \times 194.27$	
800	Ammonia direct utilisation	$\Delta G_{NH_3} = -353.00$	$\frac{\Delta G_{NH_3} - 1.5 \times \Delta G_{H_2}}{1.5 \times \Delta G_{H_2}} \times 100 = 24.7$
	Ammonia utilisation after complete cracking	$1.5 \times \Delta G_{H_2} = -1.5 \times 188.66$	