Supplementary Information (SI) for Journal of Materials Chemistry A.
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Supplementary Information

Direct Room-Temperature Synthesis of LDH Thin Films via Non-Thermal Plasma

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Table S1. Analytical Eco-scale for the LDH thin films synthesis method via O_2 non-thermal plasma (NTP) processing of sol–gel precursors.

Parameter	Details	Penalty Points
Reagent hazard penalty		
Propionic acid	GHS: Danger, Corrosion (2) + Exclamation mark (1) → 2 hazard pictograms × 2	4
Ethanolamine	GHS: Danger, Corrosion (2) + Health hazard (2) → 2 hazard pictograms × 2	4
Nickel(II) acetate tetrahydrate	GHS: Danger, Health hazard (2) + Environmental hazard (2) + Acute toxicity (2) → 3 hazard pictograms × 2	6
Reagent Amount penalty		
Propionic acid (0.5 mL)	<10 mL	1
Ethanolamine (0.5 mL)	<10 mL	1
Nickel(II) acetate tetrahydrate (0.5 mL)	<10 mL	1
Energy consumption		
NTP treatment (750 W × 9 h = 6.75 kWh)	>0.1 kWh per sample	1
Occupational hazard		
Closed plasma chamber	No open handling	0
Waste penalty		
Liquid waste (~0.1 mL per substrate)	<1 mL	1
Waste treatment penalty		
Safe disposal (professional treatment/recycling)	Effective treatment → 0 points	0
Total penalty points		**19**
Eco-Scale Score	**100 - 19**	**81**

Note: The Eco-Scale assessment was performed following the related protocols.[1-3]

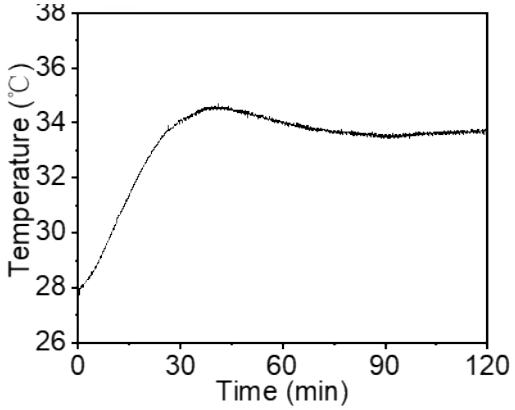

Figure S1. The temperature of the sample during NTP treatment.

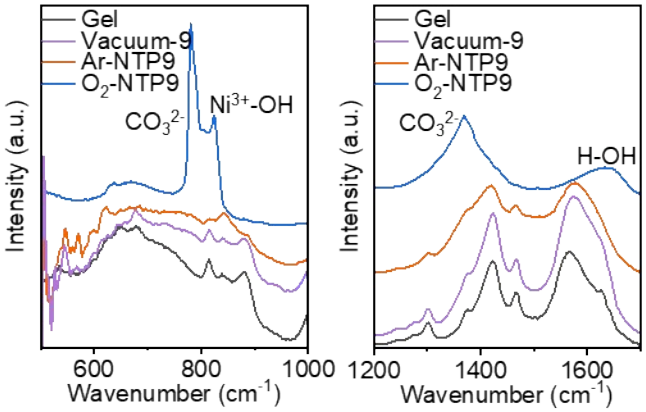

Figure S2. FTIR spectra of the as-deposited gel film, Vacuum-9 , Ar-NTP9, and O_2-NTP9 samples.

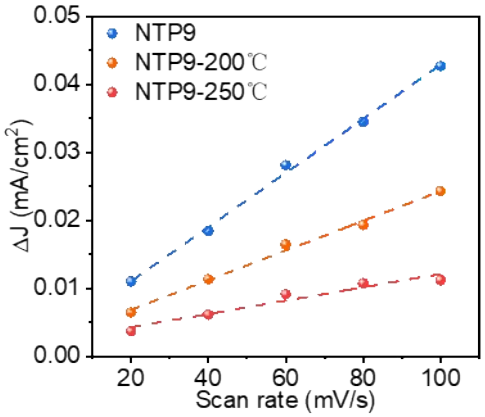

Figure S3. Linear fitting of the capacitive current density difference $(j_a - j_c)/2$ as a function of scan rate for NTP9, NTP9-200, and NTP9-250 electrodes in a non-Faradaic potential region.

References:

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2. A. Gałuszka, P. Konieczka, Z. M. Migaszewski and J. Namieśnik, *TrAC, Trends Anal. Chem.*, 2012, **37**, 61–72.
3. L. Halka, T. Kucher, M. Piponski, L. Kryskiw, N. Zarivna, M. Horyn, N. Horlachuk, K. Duve and L. Logoyda, *BMC Chem.*, 2024, **18**, 209.