

One-Pot Synthesis of NiAl-CO₃ LDH Anti-Corrosion Coatings from CO₂-Saturated Precursors

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Supporting Information

SI-1 XRD pattern of NiAl-CO₃ LDH powders

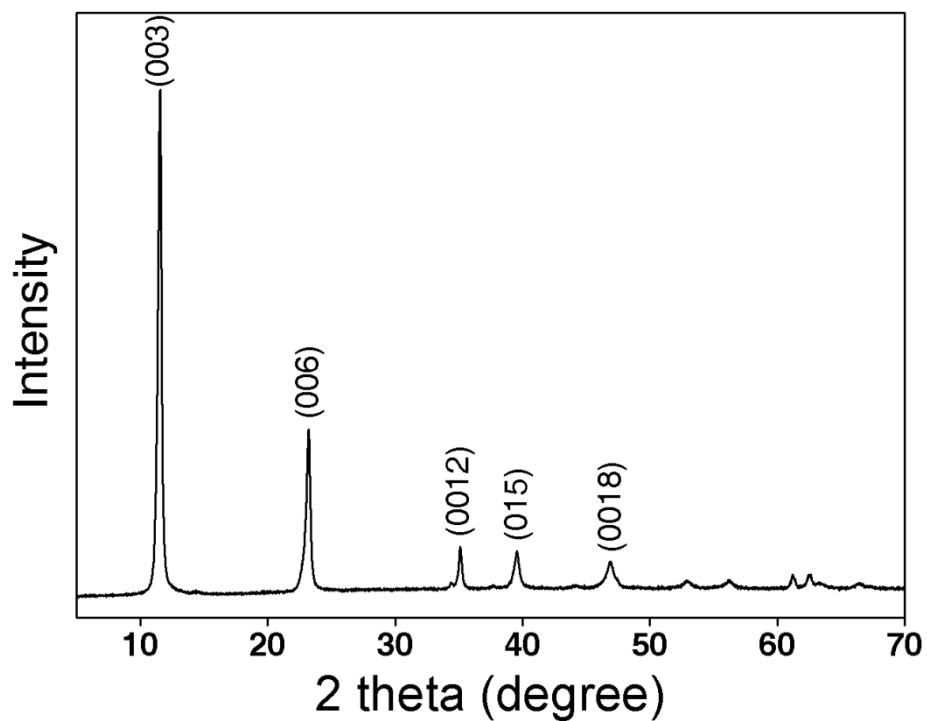


Fig. S1 XRD pattern of NiAl-CO₃ LDH powders. The sample was synthesized according to the published recipe (M. Wei, X. Y. Xu, X. R. Wang, F. Li, H. Zhang, Y. L. Lu, M. Pu, D. G. Evans and X. Duan, *Eur. J. Inorg. Chem.*, 2006, 2831).

SI-2 Influence of concentration of CO₂ dissolved in the precursor solution on nucleation and growth of NiAl-CO₃ LDH crystallites

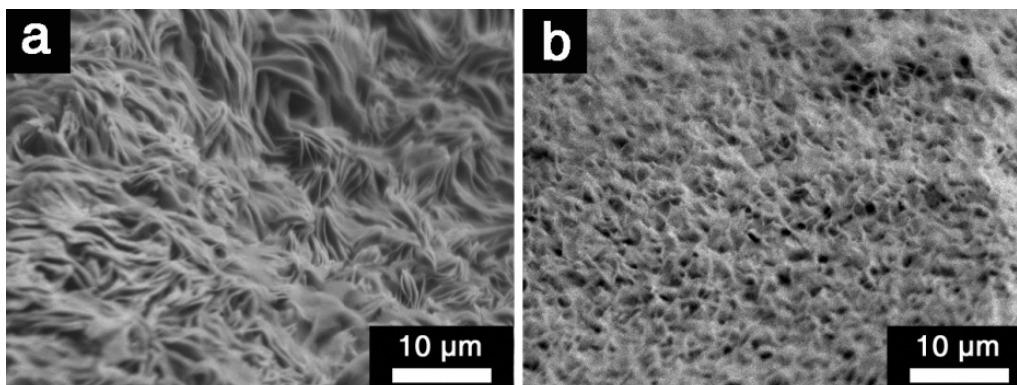


Fig. S2 Magnified cross-sectional SEM images of NiAl-CO₃ LDH films prepared from (a) DI aged and (b) CO₂-saturated precursor solutions, respectively.

Magnified cross-sectional SEM images of both the NiAl-CO₃ LDH (DI) and NiAl-CO₃ LDH (CO₂-satur) films are shown in Fig. S2. It is clear that the cross-sectional morphology of two NiAl-CO₃ LDH films is distinct. The average size for LDH crystallites in Fig. S2a is ~1 μm. In contrast, the crystal size of LDHs in Fig. S2b is much smaller (~0.1 μm). Obviously, the number density of LDH crystallites per unit area in Fig. S2b is much higher than that in Fig. S2a, which strongly supports the fact that increasing the concentration of CO₂ in the precursor solution gives rise to drastic increase of the nucleation density of NiAl-CO₃ LDH crystallites on the substrate.

In addition, compared with the NiAl-CO₃ LDH (DI aged) film, the excellent anti-corrosion capacity of the NiAl-CO₃ LDH (CO₂-satur) film indicates that LDHs prepared from CO₂-saturated precursor solution are well-intergrown and few intercrystalline defects are present in the film. These results convincingly demonstrate that the growth rate of NiAl-CO₃ LDH crystallites in the CO₂-saturated precursor solution is considerably higher.

SI-3 Illustration of the long-term durability of NiAl-CO₃ LDH (CO₂-satur)-coated Al substrate

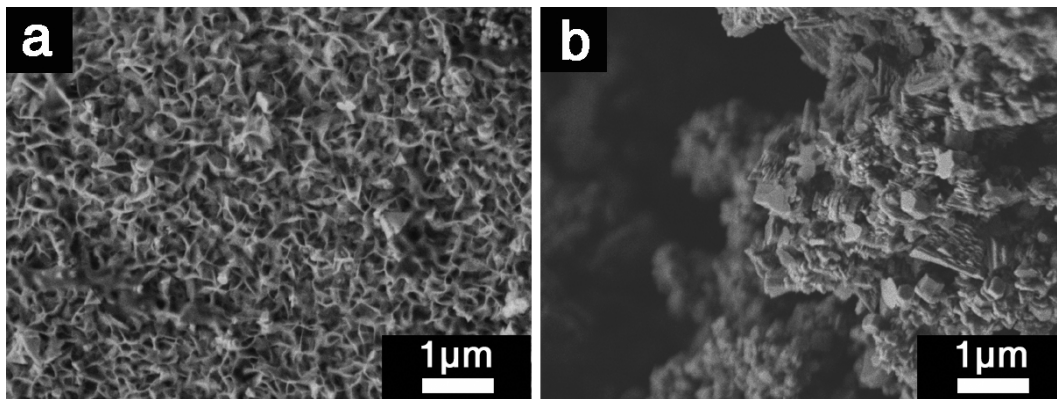


Fig. S3 SEM images of the (a) NiAl-CO₃ LDH (CO₂-satur) film and (b) bare Al substrate after immersion in 3.5 wt.% NaCl solution for 15 days.