Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics. This journal is © the Owner Societies 2015

- 1 Supporting Information
- $\mathbf{2}$
- 3



4 5

Figure S1 SEM image of synthesized Ni–Al LDHs (Ni/Al = 4) via aging under
hydrothermal condition at 383 K for 20 h captured by using a Field Emission Scanning
Electron Microscope (FE-SEM, SU-8220, Hitachi High-Technologies) at the
acceleration voltage of 3.0 kV.

10



 $\frac{1}{2}$

Figure S2 Ni K-edge XANES spectra of (a) Ni foil, (b) NiO, (c) Ni(OH)₂, and (d) as-prepared Ni–Al LDH. These spectra were measured at the BL01B1 of SPring-8 with the approval of the Japan Synchrotron Radiation Research Institute (JASRI) (Proposal No. 2013A1615). The spectrum was recorded in a transmittance mode at room temperature, using Si(111) double crystal monochromator. The photon energy was calibrated by using Ni foil.



1

 $\mathbf{2}$

Figure S3 XRD patterns of Ni–Al LDHs (a) before and (b) after the photocatalytic
reaction in an aqueous solution of NaCl.

 $\mathbf{5}$



Figure S4 The result of repeat test for the photocatalytic conversion of CO₂ in an
aqueous solution of NaCl using Ni–Al LDH photocatalyst. CO: circle, H₂: diamond.
Additive: 0.1 M NaCl, photocatalyst weight: 0.3 g, amount of solution: 1.0 L, CO₂
supply: 15 mL min⁻¹, light source: 400 W high-pressure Hg lamp.



1

 $\mathbf{2}$

3 Figure S5 Amount of CO evolved (circle) and selectivity toward CO (diamond) with 4 the change of specific surface area of Ni–Al LDH photocatalyst in the photocatalytic 5 conversion of CO₂ in an aqueous solution of NaCl. Concentration of NaCl: 0.1 M, 6 photocatalyst weight: 1.0 g, amount of solution: 1.0 L, CO₂ supply: 15 mL min⁻¹, light 7 source: 400 W high-pressure Hg lamp, photoirradiation time: 8 h.

8