

Supplementary materials

Surfactant intercalation in Li-Al based binary and ternary layered double hydroxides by the microwave-assisted rapid ion-exchange process and its application in iodine adsorption

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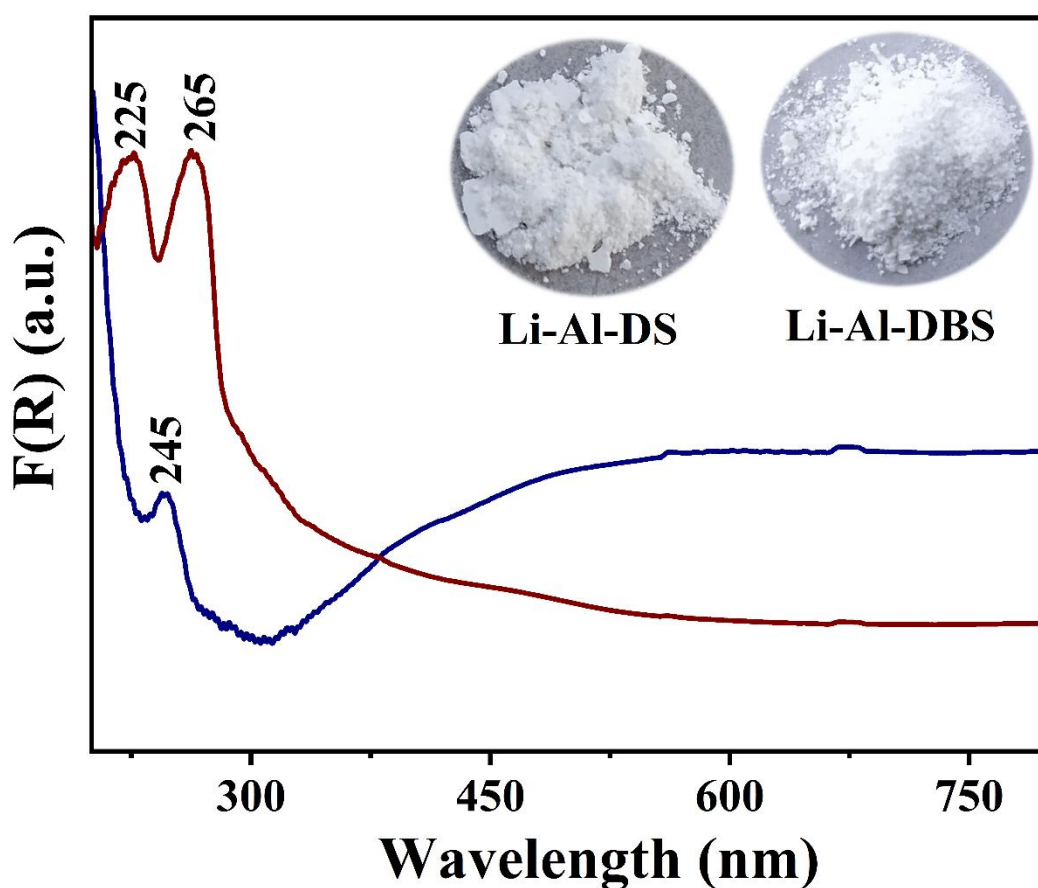


Figure S1. Diffuse reflectance spectra of Li-Al-DS (data in blue) and Li-Al-DBS (data in dark red) LDHs.

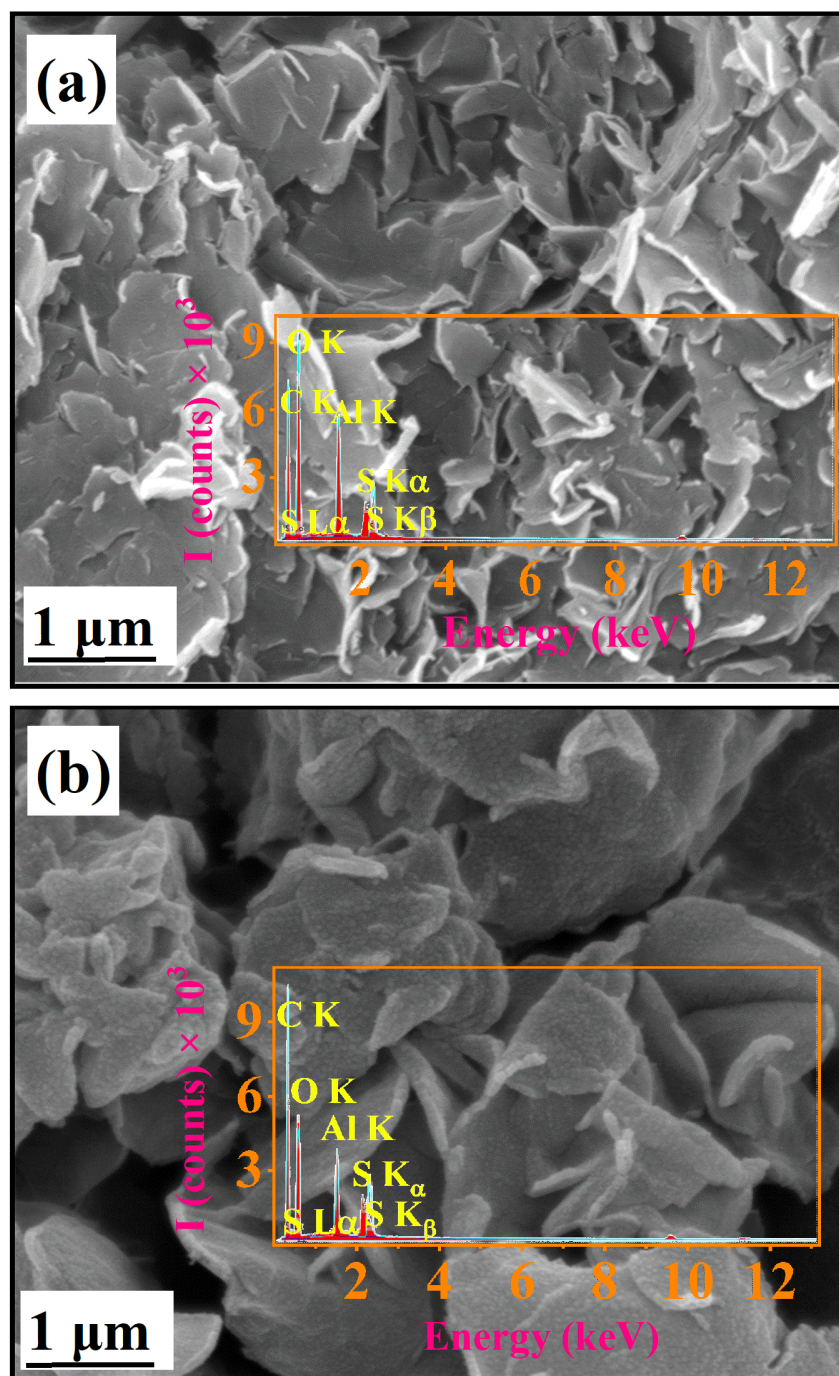


Figure S2. SEM micrographs and EDS analyses of (a) Li-Al-DS LDH and (b) Li-Al-DBS LDH.

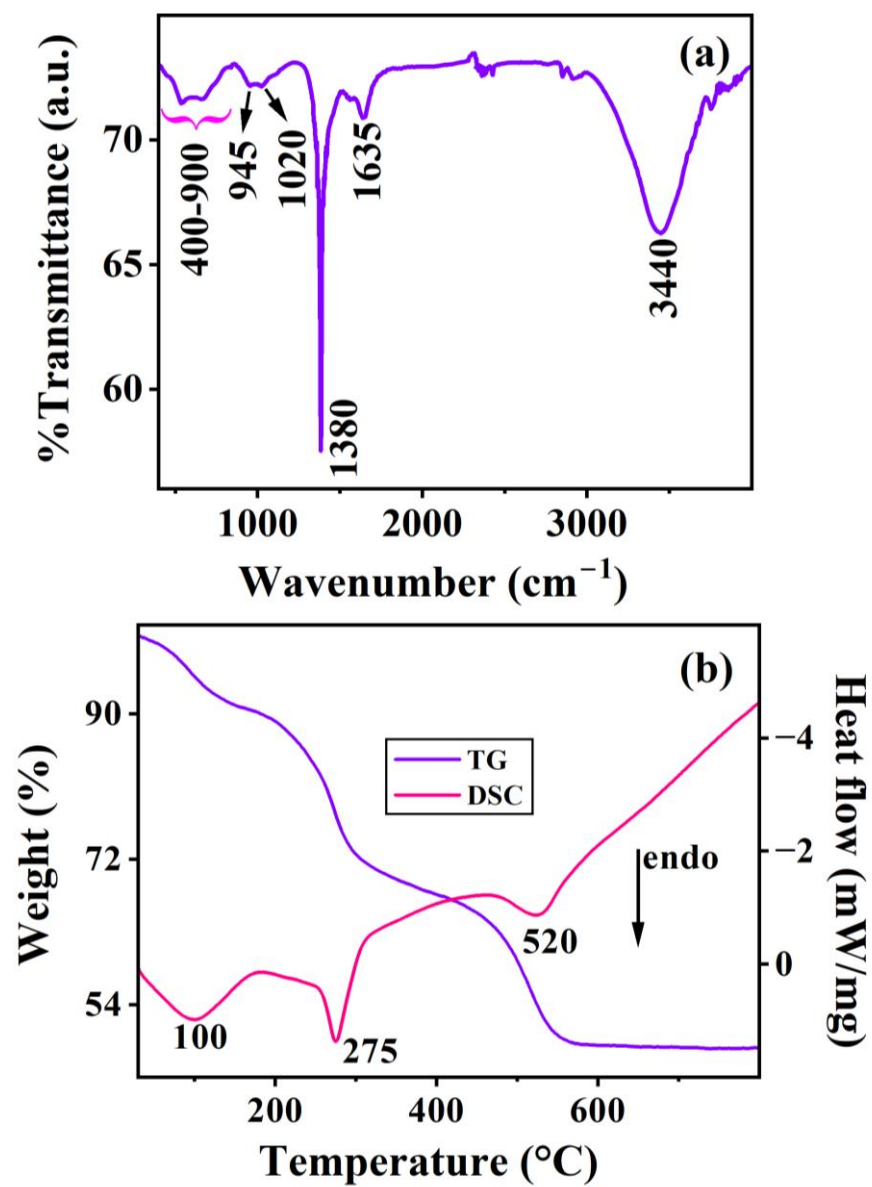


Figure S3. (a) FTIR spectrum and (b) TG-DSC traces of Li-Mg-Al- NO_3 LDH.

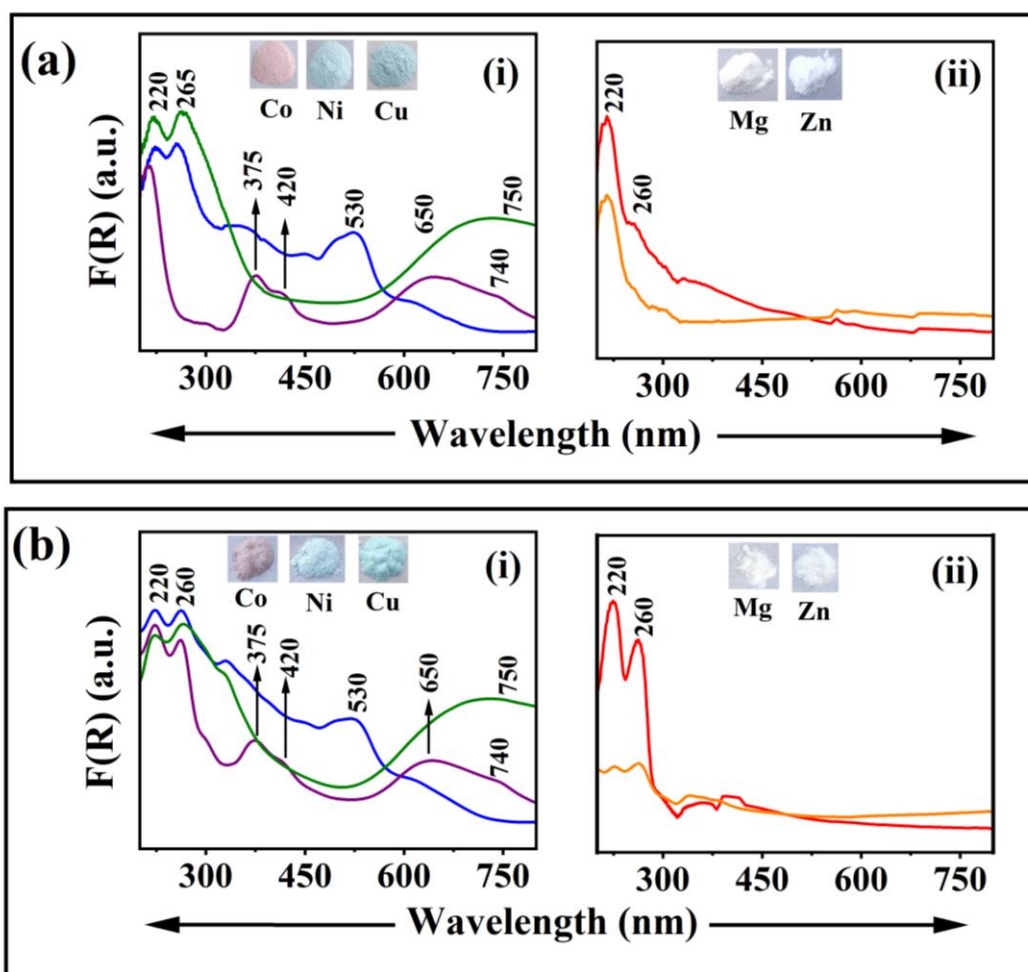


Figure S4. Diffuse reflectance spectra of (a) Li-M-Al-DS LDH and (b) Li-M-Al-DBS LDH [(i) M = Co (data in blue), Ni (data in purple), Cu (data in olive green) and (ii) M = Mg (data in red), Zn (data in orange)].

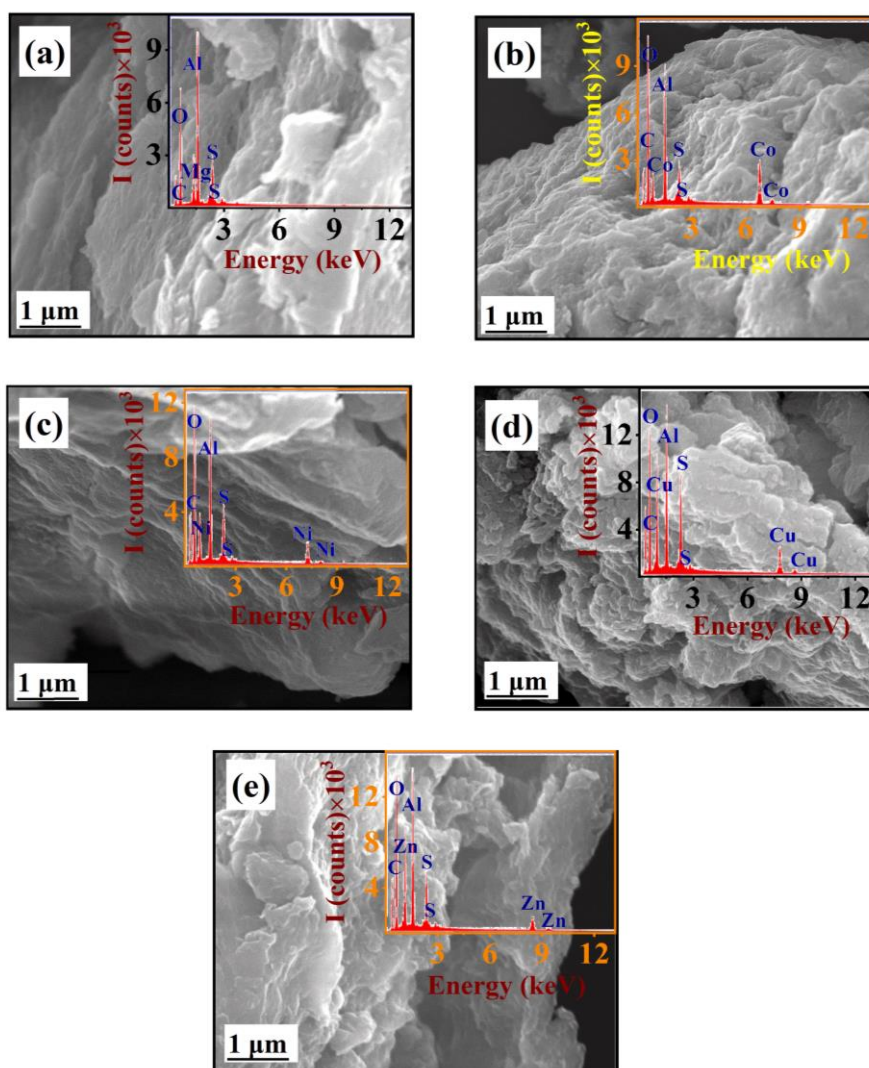


Figure S5. SEM micrographs and EDS analyses of Li-M-Al-DS LDH samples where M is (a) Mg, (b) Co, (c) Ni, (d) Cu, and (e) Zn.

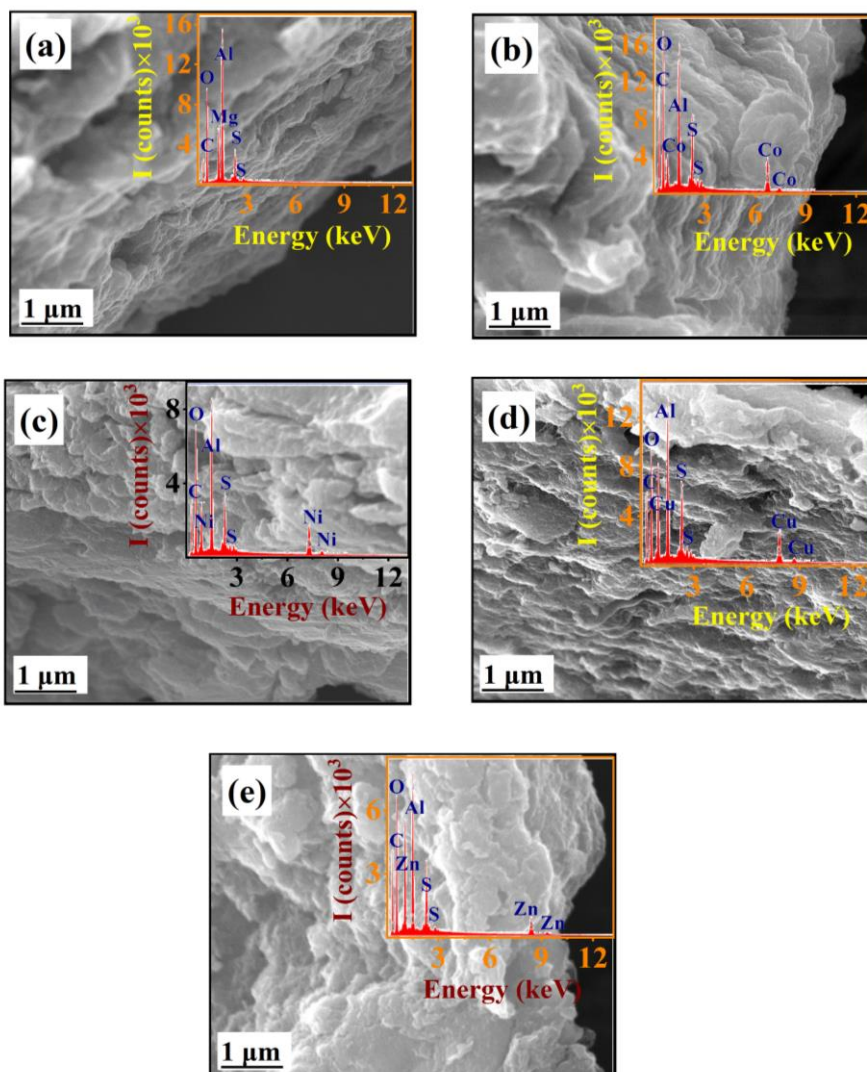


Figure S6. SEM images and EDS analyses of Li-M-Al-DBS LDH samples where M is (a) Mg, (b) Co, (c) Ni, (d) Cu, and (e) Zn.

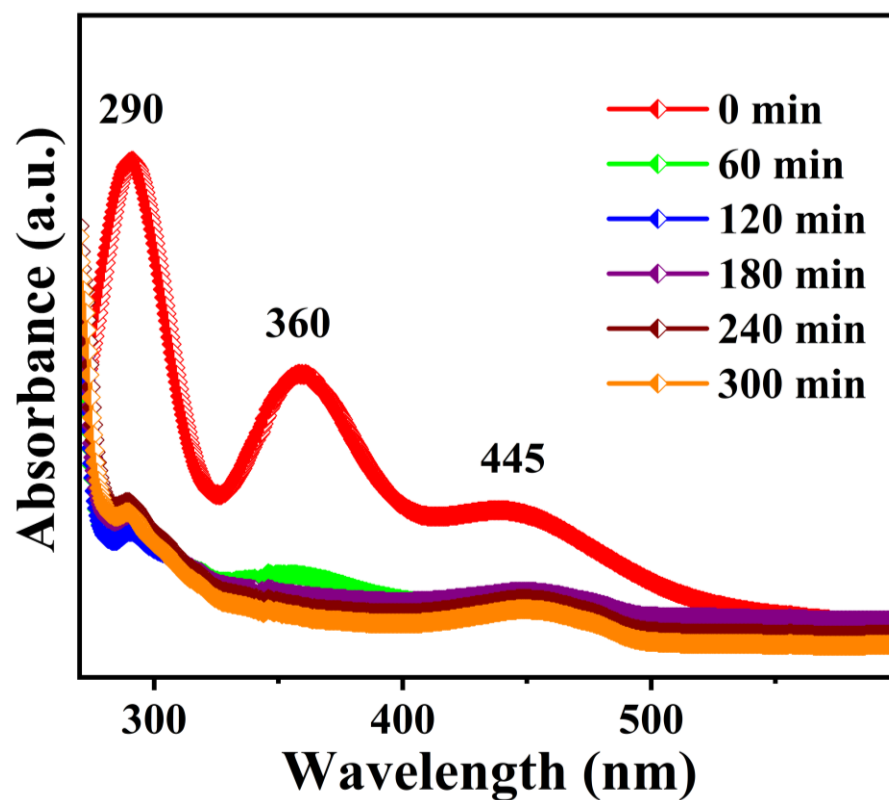


Figure S7. Time-dependent UV-visible spectra of 30 mL (25.4 mg/L) iodine solution in the presence of 50 mg Li-Al-DBS LDH sample.

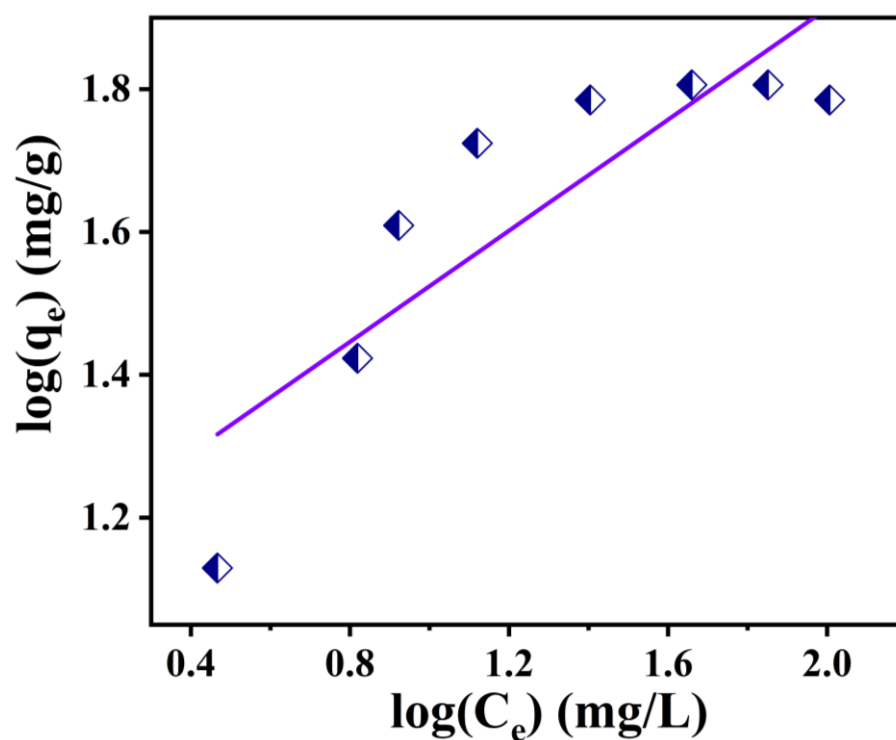


Figure S8. Plot of adsorption isotherm data fitted using Freundlich isotherm model for adsorption of iodine on Li-Al-DBS LDH sample.

Table S1. The content of elements in Li-Al-DS, Li-M-Al-DS (M = Mg, Co, Ni, Cu, and Zn), Li-Al-DBS, and Li-M-Al-DBS LDHs (M = Mg, Co, Ni, Cu, and Zn) obtained by C, H, N, and S analyses.

LDHs	C (%)	H (%)	N (%)	S (%)
Li-Al-DS	24.13	6.92	0.00	5.42
Li-Mg-Al-DS	22.39	6.56	0.00	4.96
Li-Co-Al-DS	23.52	6.56	0.00	4.85
Li-Ni-Al-DS	22.20	6.05	0.00	5.08
Li-Cu-Al-DS	24.49	6.59	0.00	5.75
Li-Zn-Al-DS	21.55	5.95	0.00	4.96
Li-Al-DBS	42.29	6.43	0.00	6.39
Li-Mg-Al-DBS	28.86	5.55	0.00	4.33
Li-Co-Al-DBS	24.07	5.57	0.00	4.16
Li-Ni-Al-DBS	25.53	5.73	0.00	4.18
Li-Cu-Al-DBS	28.19	6.43	0.00	5.12
Li-Zn-Al-DBS	27.42	5.69	0.00	4.39

Table S2. The content of elements in Li-Al-DS, Li-M-Al-DS, Li-Al-DBS, and Li-M-Al-DBS (M = Mg, Co, Ni, Cu, and Zn) LDHs (M = Mg, Co, Ni, Cu, and Zn) obtained by EDS analyses.

LDHs	Atomic percentage								
	Al	C	O	S	Mg	Co	Ni	Cu	Zn
Li-Al-DS	8.1	47.9	40.1	3.9	-	-	-	-	-
Li-Mg-Al-DS	9.9	37.5	44.7	3.4	4.4	-	-	-	-
Li-Co-Al-DS	6.7	47.5	39.5	3.1	-	3.2	-	-	-
Li-Ni-Al-DS	8.5	45.6	39.3	2.7	-	-	3.9	-	-
Li-Cu-Al-DS	8.1	44.6	40.1	2.6	-	-	-	4.6	-
Li-Zn-Al-DS	7.2	42.6	44.4	2.5	-	-	-	-	3.3
Li-Al-DBS	7.1	62.2	27.3	3.4	-	-	-	-	-
Li-Mg-Al-DBS	11.2	49.7	29.8	3.2	6.1	-	-	-	-
Li-Co-Al-DBS	10.1	52.9	27.8	3.7	-	5.5	-	-	-
Li-Ni-Al-DBS	9.1	50.7	31.5	3.6	-	-	5.1	-	-
Li-Cu-Al-DBS	8.4	54.7	28.3	3.9	-	-	-	4.7	-
Li-Zn-Al-DBS	7.5	56.5	29.2	3.1	-	-	-	-	3.7

Table S3. Iodine adsorption capacity of various LDHs used as adsorbents in the present work and references.

S.No.	Adsorbents	Iodine state	T (°C)	Capacity (mg/g)	References
1.	Li-Al-DBS-LDH	I ₂ solution in methanol	R. T.	63.96	This work
2.	Mg-Al-NO ₃ -LDH	I ₂ solution water	R. T.	10.1	[54]
3.	Ni-Ti-S _x -LDH	I ₂ solution in cyclohexane	R. T.	527.4	[44]
4.	Bi-Zn-Al-LDH	I ₂ (g)	75	433	[55]