

**DEVELOPMENT AND STUDY OF SORBENTS BASED ON LITHIUM-ALUMINUM
LAYERED DOUBLE HYDROXIDES DOPED WITH TRANSITION METALS FOR
LITHIUM EXTRACTION FROM SOLUTIONS**

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Introduction. In recent decades, lithium demand has surged, driven by the growing production of batteries for electric vehicles, portable electronics, and energy storage systems. As a strategic element with limited global reserves, lithium requires efficient extraction from diverse sources. Traditional methods such as solar evaporation from brines, electrolysis, and solvent extraction involve high energy costs, environmental risks, and low selectivity for lithium over other solution components.

Body part of the report summary. A promising approach is sorption-based methods, relying on lithium adsorption onto specialized sorbent materials. These must exhibit high capacity, selectivity for lithium, stability over multiple cycles, and regenerability .

Current sorbents include hydroxides, oxides, silica gel, activated carbon, and others. Layered double hydroxides (LDHs) are of particular interest due to their high porosity, active sites, and surface modifiability for enhanced selectivity.

This study develops novel sorbents based on lithium-aluminum LDHs doped with transition metals (Fe, Co). Doping is expected to boost lithium sorption efficiency through additional active centers and improved crystal structure stability [3-5].

The obtained sorbents were investigated and characterized using powder X-ray diffraction (XRD) and scanning electron microscopy (SEM). Sorption capacities were determined via ion chromatography.

Maximum sorption capacities were determined dynamically. Zn-doped samples reached 12.48 mg/g, Co-doped 16.13 mg/g – significantly outperforming the undoped material (5.67 mg/g).

Conclusions. An analysis of the influence of the dopant elements (Zn, Co) on the sorption capacity of the lithium-aluminium hydroxide sorbent and desorption process was carried out.

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