

# Latest Developments with Layered Double Hydroxides

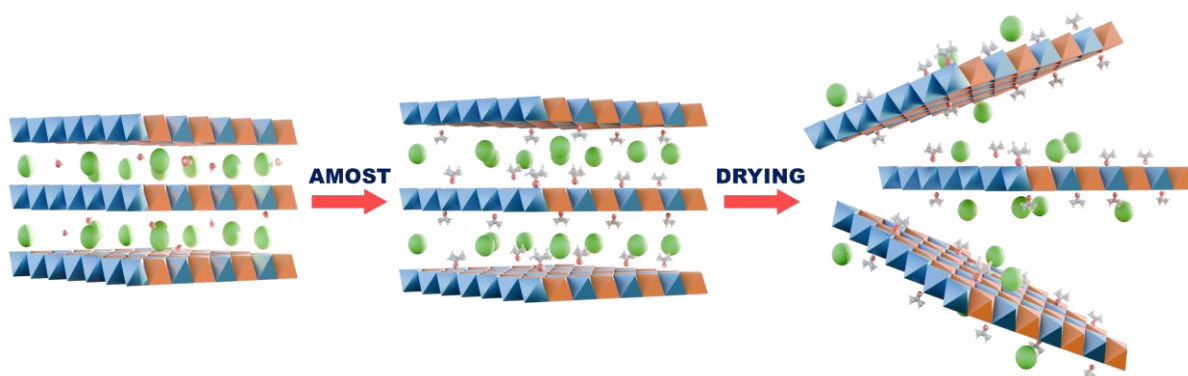
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Layered double hydroxides (LDHs) are a highly tunable class of inorganic materials with the general formula  $[M_{(1-x)}M'_x(OH)_2]^{a+} [A^{-}_{a/n}]$  where M and M' are most commonly divalent and trivalent metal cations,  $A^{n-}$  is an anion and  $0 < x < 1$ . The metal hydroxides form positively charged brucite-like layers, with the intercalated anions providing charge balance. However, the agglomeration of LDH platelets leads to low surface area, dense "stone-like" agglomerates, which limit their use in many applications.

We have developed both solvent dispersion and core@shell approaches to avoid the agglomeration of the LDH platelets. For example, our Aqueous Miscible Organic Solvent Treatment (AMOST) process can create highly dispersed LDH-based materials consisting of nanosheet dispersions. This process produces exposed active sites with high surface areas and porosity. It is now possible to tailor these materials to a wide range of novel applications such as solid CO<sub>2</sub> sorbents<sup>1</sup> and heterogeneous catalysis.<sup>2,3,4,5</sup>



Schematic illustration of the Aqueous Miscible Organic Solvent Treatment (AMOST) synthesis of highly dispersed layered double hydroxides (LDHs).

## References

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