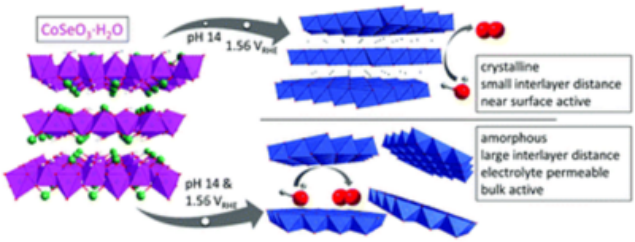
A new concept to understand the formation of bulk- and surface-active layered (oxy)hydroxides for water oxidation



Start Time: Sunday, October 4, 2020

End Time:

Understanding the formation of bulk- and surface-active layered (oxy)hydroxides for water oxidation starting from a cobalt selenite precursor

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In an interdisciplinary approach, the three UniSysCat research groups of Holger Dau, Ingo Zebger and Matthias Driess introduced a new concept to understand the formation of bulk- and surface-active layered (oxy)hydroxides for water oxidation starting from a cobalt selenite precursor, while considering the substrate and the transformation conditions.

Implementing a sustainable global energy economy requires more than the construction of solar and wind power plants, as the fluctuations of these energy sources contrast the constant energy demand of society. A solution to this problem is a highly scalable energy storage technology. In this regard, fuels are advantageous as, for their scalability, only simple tanks must be constructed instead of highly resource-/energy-demanding batteries. Fuels contain reduced chemical species that can be burned using O_2 under the release of energy. To close this energy storage cycle, oxidized compounds must be reduced while investing electric energy. The electrons for this process come from water (O^{-II}) independent of whether the oxidized species are CO_2 or protons. Therefore, catalytic oxygen evolution (OER) is the central process to form regenerative fuels from green electricity. The harsh conditions during OER lead to an *in situ* transformation of most materials. Herein, we introduce a new concept to understand this

transformation while considering the substrate and the transformation conditions. Our detailed ex- and *in situ* investigations allow us to deduce structural relationships explaining different activities in layered double hydroxides, the most promising catalysts for the alkaline OER.

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