

Catalytic Nanomaterials for Energy Conversion and Storage

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Abstract : Chemical-electrical energy conversion and storage are greatly attractive for the development of sustainable energy. Catalytic processes are heavily involved in such energy conversion and storage. Development of high-performance catalyst nanomaterials relies on tuning material structures at nanoscale. This is in particular manifested in the design of catalysts demanding both high activity and durability. Here, a research system will be presented that connects fundamental investigation on well-defined extended surfaces (e.g. single crystal surfaces), extrapolation onto nanocrystals with highly controlled shape and size, exploration of interfacial interaction using novel nanocrystal superlattices as platform, and finally design of high performance catalysts in which all the possible beneficial properties from complex functional structures are implemented. Using recently published results, it will be demonstrated that optimal and fine balanced activity and durability, as well as tunable functionality, can be achieved by carefully tailoring the nanostructure of catalytic nanomaterials.

Keywords : energy, nanomaterials, catalysis, electrocatalysis

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