**Nanostructural Design towards the Improvement of the Photoelectrochemical Devices**

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It has generally been known that the nanoscale structure plays an important role in the behavior of most of solid state devices. In the semiconductor photoelectrochemistry, the nanostructure of the surface layer and of the solid-liquid interface is closely related to its functionality.

The recent progress of the nanotechnological preparation and characterization methods allow the utmost fine control of the architectural design of materials. A variety of subtly designed semiconductor materials for both electrodes and particles becomes available.Several types of the tailored designs are:

Qquantization ⟶ { Nanostructure, Nanoparticle, Thin Film

Modification ⟶ { Surface Derivatization, Coating, LB film, Bulk Modification, Doping

Tailored Interface ⟶ { Multi-layer, Surface Hybridization

Several applications in the photoelectrochemical systems brought about by the nanotechnology are introduced for the following reactions.

1) Overall water splitting.
2) CO2 reduction.
3) Oxidative deterioration.
4) Solar energy conversion.