Nanotechnology for Solar Energy Conversion

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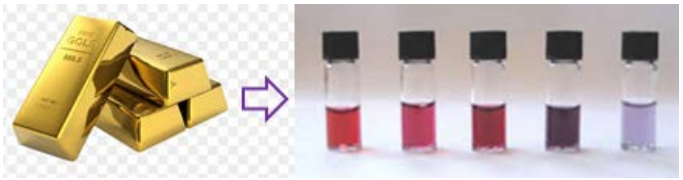
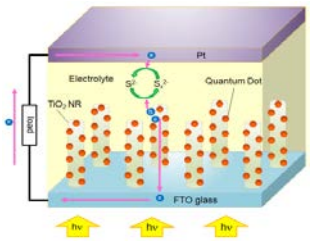
Nanotechnology

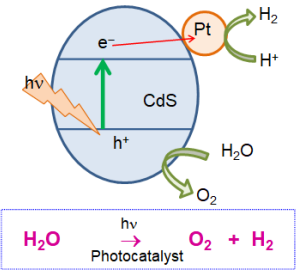
Gold (bulk) Gold (nano particles)



Solar Energy

Electrical Energy Chemical Energy

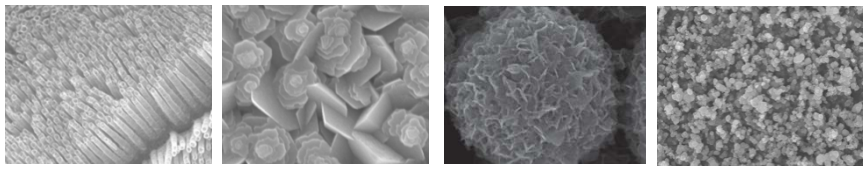




Structure of QD solar cell

Principle of H_2 production

Semiconductor nanophotocatalysts



TiO_2 nanotube ZnO nanoflower In_2S_3 microsphere CdS nanocomposite

Content:

Solar energy can be converted into electrical energy (solar cells) or chemical energy (hydrogen energy). The key materials for the conversion of solar energy are semiconductor photocatalysts. Nanostructured materials show interesting physical and chemical properties, which differ from their bulk. We synthesize nano photocatalysts of different sizes and shapes and evaluate their activities in terms of hydrogen production via water splitting. Moreover, we fabricate nanostructured thin films of different semiconductor photocatalysts for a low-cost solar cell (quantum dot solar cell). In other part of our research, we apply nanotechnology to improve the electromagnetic effect of multiferroic materials, which have potential for applications in energy-efficient electronic devices.

Appealing point:

I am proactively interacting with academia-industry research collaboration. I have long-time experiences in material design, synthesis, and application. Using these experiences, I can contribute to different fields of research.

Yamagata University Graduate School of Science and Engineering
Research Interest : Semiconductor nanomaterials, Solar-hydrogen, Solar cells, Magnetic materials

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