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The new photoelectric materials for analytical applications

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Photoelectrochemical technique has attracted tremendous attentions since it combined merits of both optical and electrochemical methods, which has been applied as efficient strategy to develop DNA sensor, cytosensing, enzymatic analysis, immunoassay and many other small molecules sensing etc. The mechanism of photoelectrochemical sensor is based on reductive property of photoelectron or oxidative capacity of photo-generated hole. Howbeit, efficient and stable photocatalyst that are capable of harvesting visible light for an optimized use of solar energy are still very prerequisite. In order to best facilitate the specific analytical system, in our group, through theoretical simulations with calculation of the binding energies, a variety of semiconductor and composite materials have been designed and optimized including silver halide series of composites (AgBr/g-C₃N₄/N-graphene, AgCl/Ag nanocrystals, Ag@AgCl/BiVO₄, AgX/graphene aerogels, AgClxBr1-x, Ag@AgBr/SO₃H-Graphene, etc.), series of doped & hybrid TiO₂ composites (ug-C₃N₄/TiO₂, GO/TiO₂, SO₃H-Graphene/TiO₂, Ce-S-TiO₂/SO₃H-graphene, polyaniline-graphene/TiO₂, etc.) and other semiconductors (V-doped BiMoO₄, Pd/SnO₂/graphene, etc.) It reveals that such photoelectrochemical technique is considered to be an ideal platform for water quality monitoring & purification, global antioxidant capacity assessment, o-diphenol discrimination, carbon dioxide reduction and other applications. It is anticipated that the photoelectrochemical technique will open up new insights into the architectural design of novel photocatalysts with high photoactivity and further utilizations in the environmental, food and energy field.

Biography

Dongxue Han is an Associate Professor of Changchun Institute of Applied Chemistry, Chinese Academy of Science, China. He has completed his Bachelor of Science from Northeast Normal University, Master of Science from Northeast Normal University, Doctor of Science from Changchun Institute of Applied Chemistry, Chinese Academy of Sciences and Post-doctoral studies at Abo Akademi University in Finland. His main research areas include photoelectrochemical materials, nano-structured composite materials and the electrode interface modification, electrochemical sensing applications and so on. He has published as the first or corresponding author, 37 scientific papers in SCI journals such as *Advanced Materials*, *Chemical Science*, *Analytical Chemistry*, *Chemical Communications*, *Nanoscale* and they have been cited for more than 3800 times. He has applied for 13 patents, out of which, 6 have been authorized.

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