

## NIMS

**Jinhua Ye**

### 1. Main results

Novel visible light active photocatalyst for efficient environment remediation:

A novel photocatalyst  $\text{Ag}_2\text{GeO}_3$  was developed<sup>1)</sup>, where the active wavelength extends up to 660 nm, covering the main components of the solar spectrum and indoor illuminations. The photocatalyst exhibited excellent activities in photodegradation and mineralizations of various organic dyes, even under weak light irradiation of white fluorescent lamp. The high performance can be reasonably attributed to its unique crystal and electronic structures, and demonstrate a great potential of the material to be applied for waste water treatment.

### References

- 1) S. Ouyang, N. Kikugawa, Z. Zou, J. Ye, "Effective Decolorizations and Mineralizations of Organic Dyes over a Silver Germanium Oxide Photocatalyst under Indoor-Illumination Irradiation", *Applied Catalysis A: General*, 366, 309-314, 2009.

### 2. Original Paper

- 1) Weifeng Yao, Cunping, Huang, Jinhua Ye, "Hydrogen Production and Characterization of MLaSrNb<sub>2</sub>NiO<sub>9</sub> (M=Na, Cs, H) Based Photocatalysts", *Chem. Mater.*, 22(3), 1107-1113, 2010.
- 2) H. Shi, Z. Li, J. Ye, Z. Zou., "2-propanol photodegradation over molybdates: effects of chemical compositions and electronic structures", *J Phys. D: Appl. Phys.* 43(8), Art: 085402, 2010.
- 3) Yingpu Bi and Jinhua Ye, "Heteroepitaxial growth of platinum nanocrystals on AgCl nanotubes via galvanic replacement reaction", *Chem. Commun.*, 46, 1532 – 1534, 2010
- 4) Guangcheng Xi and Jinhua Ye, "Ultrathin SnO<sub>2</sub> Nanorods: Template- and Surfactant-Free Solution Phase Synthesis, Growth Mechanism, Optical, Gas-Sensing and Surface Adsorption Properties", *Inorg. Chem.*, 49, 2302-2309, 2010.
- 5) Z. G. Yi and J. H. Ye, "Band gap tuning of Na<sub>1-x</sub>La<sub>x</sub>Ta<sub>1-x</sub>Cr<sub>x</sub>O<sub>3</sub> for H<sub>2</sub> generation from water under visible light irradiation", *J Appl. Phys.*, 106,(7), Article Number: 074910, 2009.
- 6) J. Lv J, ZY Zhao, ZS Li, JH Ye, ZG Zou, "Preparation and photocatalytic property of LiCr(WO<sub>4</sub>)<sub>2</sub>", *J. Alloys Comp.*, 485 (1-2), 346-350, 2009.
- 7) Yingpu Bi and Jinhua Ye, "In-situ oxidation synthesis of Ag/AgCl core-shell nanowires and their photocatalytic properties", *Chem. Comm.*, 6551-6552, 2009.
- 8) M. V. Shankar, D. Wang, J. Ye, " Inorganic alkaline-sols as precursors for rapid synthesis of ETS-10 microporous titanasilicates and their photocatalytic reforming of methanol under

- visible-light irradiation”, *Catalysis Communications*, 11, 261-265, 2009.
- 9) Guoqiang Li, Shicheng Yan, Zhiqiang Wang, Xiangyan Wang, Zhaosheng Li, Jinhua Ye, and Zhigang Zou and, “Synthesis and visible light photocatalytic property of polyhedron-shaped AgNbO<sub>3</sub>”, *Dalton Transactions*, 40, 8519-8524, 2009.
  - 10) H. Shi, X. Li, D. Wang, Y. Yuan, Z. Zou, J. Ye, “NaNbO<sub>3</sub> nanostructures: facile synthesis, characterization, and their photocatalytic properties”, *Catalysis Lett.*, 132(1-2), 205-212, 2009.
  - 11) Y. Pihosh, I. Turkevych, J.H. Ye, M. Goto, A. Kasahara, M. Kondo, M. Tosa, “Photocatalytic Properties of TiO<sub>2</sub> Nanostructures Fabricated by Means of Glancing Angle Deposition and Anodization”, *J. Electr. Soc.*, 156(9), K160-K165, 2009.
  - 12) M. Oshikiri, M. Boero, A. Matsushita, J. Ye, “Water adsorption onto Y and V sites at the surface of the YVO<sub>4</sub> photocatalyst and related electronic properties”, *J. Chem. Phys.*, 131, 034701, 2009.
  - 13) S. Ouyang, N. Kikugawa, Z. Zou, J. Ye, “Effective Decolorizations and Mineralizations of Organic Dyes over a Silver Germanium Oxide Photocatalyst under Indoor-Illumination Irradiation”, *Applied Catalysis A: General*, 366, 309-314, 2009.
  - 14) Jun Lv, Tetsuya Kako, Zhigang Zou, and Jinhua Ye, “Band structure design and photocatalytic activity of In<sub>2</sub>O<sub>3</sub>/N-InNbO<sub>4</sub> Composite”, *Appl. Phys. Lett.*, 95, 032107, 2009.
  - 15) M. Khajeh Aminian, N. Taghavinia, A. Irajizad, S. M. Mahdavi, J. Ye, M. Chavoshi and Z. Vashaei, “Two dimensional clustering of nanoparticles on the surface of cellulose fibers”, *J. Phys. Chem. C*, 113, 12022-12027, 2009
  - 16) H. Shi, X. Huang, H. Tian, J. Lv, Z. Li, J. Ye, Z. Zou, “Correlation of crystal structures, electronic structures and photocatalytic properties in W-based oxides”, *J Phys. D: Appl. Phys.* 42(12), Art. 125402, 2009.
  - 17) H. Shi, X. Li, H. Iwai, Z. Zou, J. Ye, “2-Propanol Photodegradation over Nitrogen-Doped NaNbO<sub>3</sub> Powders under Visible Light Irradiation”, *J. Phys. Chem. Solids*, 70, 931-935, 2009.
  - 18) Di Chen and Jinhua Ye, “Selective-synthesis of high-performance single-crystalline Sr<sub>2</sub>Nb<sub>2</sub>O<sub>7</sub> nanoribbons and SrNb<sub>2</sub>O<sub>6</sub> nanorods photocatalysts”, *Chem. Mater.*, 21(11), 2327-2333, 2009
  - 19) M. Oshikiri, M. Boero, A. Matsushita, J. Ye “Water molecule adsorption properties on surfaces of MVO<sub>4</sub> (M = In, Y, Bi) photo-catalysts”, *Journal of Electroceramics*, 22(1-3), 114-119, 2009
  - 20) Chen D, Ouyang SX, Ye JH, “Photocatalytic Degradation of Isopropanol Over PbSnO<sub>3</sub> Nanostructures Under Visible Light Irradiation”, *Nano Scale Research Letters*, 4(3), 274-280, 2009

### 3. Conference Presentations (International & Domestic)

#### Invited talks

- 1) Jinhua YE, Nano photocatalytic Materials for Water Treatment, 47th Nano Particles Research Meeting, 2009/05/22, Tokyo Institute of Technology(Ookayama, Tokyo)
- 2) Jinhua YE, Tetsuya KAKO, Naoki KIKUGAWA, Mitsutake OSHIKIRI, Research and Development of Nano Complex Oxide Photocatalytic Materials, 9<sup>th</sup> Meeting of Photo Functionalized Materials Society, 2009/07/15, University of Tokyo, Tokyo
- 3) Jinhua YE, Nano Photocatalytic materials; possibilities and challenges, 2nd World Materials Summit on Advanced Materials, MRS China, 2009/10/12-2009/10/15, The Shilla Hotel, Suzhou, Jiangsu, China
- 4) Jinhua YE, Research Activity of NIMS Photocatalytic Materials Center, 2009 Annual Meeting and Exhibition of Chinese Materials Society, 2009/10/15-2009/10/18, Suzhou Convention Center, Suzhou, Jiangsu, China
- 5) Jinhua YE, Nano Photocatalytic materials, The 5th Nanjing/Hokkaido University Joint Symposium & Nanjing/Hokkaido-NIMS/MANA Joint Symposium on Advanced Chemistry, 2009/11/08-2009/11/12, Nanjing University, Nanjing, China
- 6) Jinhua YE, Nano Photocatalytic materials; possibilities and challenges, H21 Meeting on Environment and Energy of the 151 Committee, 2009/11/24, University of Tokyo, Tokyo

#### **Oral Presentation**

- 1) LI Xiukai, Naoki KIKUGAWA, Jinhua YE, Preparation and Photocatalytic Properties of Nitrogen-doped Lamellar Solid Acids for Visible Light Photocatalysis, Japan Chemical Society Annual Meeting 2009, Japan Chemical Society, 2009/03/27-29, Nihon University, Funabashi, Chiba
- 2) CHEN Di, Jinhua YE, Synthesis of Hollow Shell Structured WO<sub>3</sub> and its Enhanced Photocatalytic Activity, Japan Chemical Society Annual Meeting 2009, Japan Chemical Society, 2009/03/27-29, Nihon University, Funabashi, Chiba
- 3) TONG Hua, Jinhua YE, Niobate Nanomaterials Derived from Isopolyniobate Anions, Japan Chemical Society Annual Meeting 2009, Japan Chemical Society, 2009/03/27-29, Nihon University(Funabashi, Chiba)

- 4) Jinhua YE, Tetsuya KAKO, Defa WANG, LI Xiukai, Zhigang ZOU, Novel Oxide Photocatalytic Materials Active under Visible-light-irradiation Developed by Band Edge Engineerin, 2009 MRS spring meeting, 2009/04/13-2009/04/17, San Francisco Marriott, San Francisco, USA
- 5) CHEN Di, Jinhua YE, Controlled synthesis and photocatalytic properties of niobate nanostructures, 2009 MRS spring meeting, 2009/04/13-2009/04/17, San Francisco Marriott, San Francisco, USA
- 6) Tetsuya KAKO, JinhuaYE, Efficient decomposition of gaseous acetaldehyde by ilmenite-structured AgSbO<sub>3</sub> photocatalysis under visible light irradiation, 2009 MRS spring meeting, 2009/04/13-2009/04/17, San Francisco Marriott, San Francisco, USA
- 7) Mitsutake OSHIKIRI, Mauro Boero, Akiyuki MATSUSHITA, Jinhua YE, Electronic Structure Properties of the Photo-Catalysts YVO<sub>4</sub> and InVO<sub>4</sub> Slab Systems with Water Molecules Adsorbed on the Surfaces, 2009 MRS spring meeting, 2009/04/13-2009/04/17, San Francisco Marriott, San Francisco, USA
- 8) Tetsuya KAKO, Jinhua YE, Enhancement of photocatalytic activity of mixed phase AgSbO<sub>3</sub> under visible light irradiation, Japan Chemical Society Annual Meeting2009, Japan Chemical Society, 2010/03/26 - 2010/03/29、 Kinki University, Osaka
- 9) LI Quiye, Tetsuiya KAKO, Jinhua YE, Carbon nitride polymers sensitized N-doped tantalic acid for visible-light-induced photocatalytic hydrogen evolution, Japan Chemical Society Annual Meeting2009, Japan Chemical Society, 2010/03/26 - 2010/03/29, Kinki University, Osaka
- 10) OUYANG Shuxin, Naoki KIKUGAWA, Jinhua YE, Photophysical and potocatalytic properties of new silver germanium oxide Ag<sub>2</sub>GeO<sub>3</sub>: effective dye degradations under the irradiation of white fluorescent lamp、 Japan Chemical Society Annual Meeting2009, Japan Chemical Society, 2010/03/26 - 2010/03/29, Kinki University, Osaka

#### **Poster Presentation**

- 1) 15. YUE Bing, Tetsuya KAKO, Jinhua YE, Zinc Containing Carbon Nitride hybrid Materials as a Novel Photocatalysts for Hydrogen Evolution with Visible Light, The 5th Nanjing/Hokkaido University Joint Symposium & Nanjing/Hokkaido-NIMS/MANA Joint

Symposium on Advanced Chemistry, 2009/11/08-2009/11/12, Nanjing University, Nanjing, China

- 2) CAO Junyu, Naoki KIKUGAWA, Tetsuya KAKO, Jinhua YE, Influence of Fe<sup>2+</sup> dopant on pulsed-laser-deposited Fe<sub>2</sub>O<sub>3</sub> thin films for water splitting The 5th Nanjing/Symposium on Advanced Chemistry, 2009/11/08-2009/11/12, Nanjing University, Nanjing, China
- 3) CHEN Xiaoqing, Tetsuya KAKO, Jinhua YE, Photonic crystals coupling to WO<sub>3</sub> films for enhancement of photoelectronic conversion efficiency, The 5th Nanjing/Hokkaido University Joint Symposium & Nanjing/Hokkaido-NIMS/MANA Joint Symposium on Advanced Chemistry, 2009/11/08-2009/11/12, Nanjing University, Nanjing, China
- 4) BI Yingpu, Jinhua YE, Synthesis of metal/semiconductor core-shell nanomaterials, The 16<sup>th</sup> Symposium of Photo Functionalized Materials Society, 2009/12/02, KSP Hall, Kanagawa Science Park, Kawasaki
- 5) OUYANG ShuxinJinhua YE, Amorphous and Porous ZnO:GaN Solid-solution Photocatalyst, The 16<sup>th</sup> Symposium of Photo Functionalized Materials Society, 2009/12/02, KSP Hall, Kanagawa Science Park, Kawasaki
- 6) Naoki KIKUGAWA, Liqun YANG, Takehiko MATSUMOTO, Ye Jinhua, Degradation of organic dye over a semiconducting oxide LiBiO<sub>3</sub> under illumination of white fluorescent lamp, The 16<sup>th</sup> Symposium of Photo Functionalized Materials Society, 2009/12/02, KSP Hall, Kanagawa Science Park, Kawasaki
- 7) YUE Bing, Naoki KIKUGAWA, Jinhua YE, Zinc Containing Carbon Nitride hybrid Materials as a Novel Photocatalysts for Hydrogen Evolution with Visible Light, The 16<sup>th</sup> Symposium of Photo Functionalized Materials Society, 2009/12/02, KSP Hall, Kanagawa Science Park, Kawasaki
- 8) Tetsuya KAKO, JinhuaYE, Photocatalytic Activity of (FeTaO<sub>4</sub>)<sub>x</sub>(TiO<sub>2</sub>)<sub>1-x</sub> Solid Solution, The 16<sup>th</sup> Symposium of Photo Functionalized Materials Society, 2009/12/02, KSP Hall, Kanagawa Science Park, Kawasaki
- 9) LI Quiye, Tetsuya KAKO, Jinhua YE, Adsorption and Visible Light Photoactivity of One Dimensional Nano Structured Silver Titanates, The 16<sup>th</sup> Symposium of Photo

Functionalized Materials Society, 2009/12/02, KSP Hall, Kanagawa Science Park,  
Kawasaki

#### **4. International Collaborations**

- 1) Collaborate with Nanjing Univ., China, on “Research on solar energy conversion and environmental purification materials”. Exchanges of researchers (including graduate school students), exchanges of research information and promotion of joint research programs were actively conducted.
- 2) Collaborate with Universität Hannover, Germany, on “Research and Development of Photocatalysis Materials”. Exchanges of researchers (including graduate school students), exchanges of research information and promotion of joint research programs were actively conducted.
- 3) Collaborate with The University of Queensland, Australia, on “Research and Development of Photocatalysis Materials for CO<sub>2</sub> reduction and conversion”. Exchanges of researchers (including graduate school students), exchanges of research information and promotion of joint research programs were actively conducted.

#### **5. Others**

Organized the 3rd Japan-China Joint Symposium on Advanced Photocatalytic Materials, Feb. 22-24, 2010, NIMS, Tsukuba, Japan