

# **ASNFC 2017**

## **The 4th China-Japan Academic Symposium on Nuclear Fuel Cycle**

### **第四届中日核燃料循环学术研讨会**

#### **Background**

As a high-density energy with almost no discharge of greenhouse gas, nuclear energy plays an important role in long-term energy security and global warming prevention. However, to realize a sustainable development of nuclear energy for the future, it is necessary to save uranium resource and minimize radioactive waste. Advanced nuclear fuel cycle can achieve such goals, thus greatly contributes to the peaceful use of nuclear power for mankind. The ASNFC provides a platform for the scientists mainly from China and Japan to discuss timely their academic achievements and exchange scientific information related to nuclear fuel cycle.

The first ASNFC was held in 2011 in Shanghai, China. It was followed by ASNFC 2013 in Shanghai, China and ASNFC 2015 in Tokyo, Japan. Following the successful previous symposiums of this series, the 4<sup>th</sup> symposium ASNFC 2017 will be held in Lanzhou, China.

## **Scope**

The ASNFC 2017 focuses on recent developments in the fundamental chemistry involved in nuclear fuel cycle. The sessions in ASNFC 2017 cover the following areas:

Session 1: Basic chemistry of actinides and fission products

Session 2: Nuclear and radiochemistry related to nuclear fuel cycle

Session 3: Advanced reprocessing and separation technologies (hydro and pyro)

Session 4: Separation Chemistry of 4f/5f elements

Session 5: Separation and Transmutation of fission products on resourceability

Session 6: Decommissioning of nuclear facilities and radioactive wastes disposal

## **Organizers**

Organizing Committee of ASNFC 2017

School of Nuclear Science and Technology/ The Key Laboratory of Special Function Materials and Structure Design, Ministry of Education, Lanzhou University (LZU)

Research Laboratory for Nuclear Reactors (RLNR), Tokyo Institute of Technology (Tokyo Tech)

Institute of Modern Physics, Chinese Academy of Science

## **Co-organizers**

National Natural Science Foundation of China (NNSFC)

Beijing Contact center, Japan Society for the Promotion of Science (JSPS)

## **Chairs**

General Chairs:

Wangsuo Wu (Lanzhou University)

Kenji Takeshita (Tokyo Institute of Technology)

Yuezhou Wei (Guangxi University/ Shanghai Jiao Tong University)

Honorary Chairs:

Zhifang Chai (Academician of the Chinese Academy of Sciences, Soochow University/ Institute of High Energy Physics, CAS)

Masaki Ozawa (Professor Emeritus, Tokyo Institute of Technology)

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Toshio Wakabayashi (Professor Emeritus, Tohoku University.)

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Yasuhisa Ikeda (Professor Emeritus, Tokyo Institute of Technology)

Ye Guoan (Professor, China Institute of Atomic Energy)

Chunli Liu (Professor, Peking University)

Shoujian Li (Professor, Sichuan University)

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Hai Bian (Senior Engineer, CNNC Lanzhou Uranium Enrichment Co. Ltd.)  
Jing Chen (Professor, Tsinghua University)  
Zhi Qin (Professor, Institute of Modern Physics, CAS)  
Koichiro Takao (Associate Professor, Tokyo Institute of Technology)  
Masanobu Nogami (Associate Professor, Kinki University)  
Takehiko Tsukahara ((Associate Professor, Tokyo Institute of Technology)  
Tatsuya Suzuki (Professor, Nagaoka University of Technology)  
Toshihiko Ohnuki (Professor, Tokyo Institute of Technology)  
Shuao Wang (Professor, Soochow University)  
Xiangke Wang (Professor, North China Electric Power University)  
Ning Liu (Professor, Sichuan University)

## **Academic Committee**

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Chuan-pin Lee (National Cheng Kung University, Taiwan)  
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Tatsuro Matsumura (Japan Atomic Energy Agency)  
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Mei Li (Professor, Harbin Engineering University)  
Haiying Fu (Professor, Shanghai Institute of Applied Physics, CAS)  
Tao Yu (Associate Professor, East China University of Technology)

## **Co-sponsorship**

Atomic Energy Society of Japan  
China Nuclear Energy Association  
Shanghai Institute of Applied Physics, Chinese Academy of Sciences  
Institute of Modern Physics, Chinese Academy of Sciences  
Chinese Nuclear Society  
China Research Center, Japan Science and Technology Agency  
Japan-China Science and Technology Exchange Association  
Japan Society of Nuclear and Radiochemical Sciences

# Program

## **Chairpersons /ASNFC 2017**

**China:** Wangsuo Wu, Yuezhou Wei, Shoujian Li, Zhijun Guo,  
Dongqi Wang, Chuanqin Xia, Wenxin Li, Shunyan Ning,  
Guoxin Tian

**Foreigner:** Masaki Ozawa, Kenji Takeshita, Toshihiko Ohnuki,  
Tetsuo Fukasawa, Tatsuya Suzuki, Masanobu Nogami, Koichiro Takao,  
Tatsuro Matsumura

## **Commendation Committee for Best Poster Award**

**China:** Yongdong Jin (Principal), Tao Yu, Chao Yan, Zhan Li

**Foreigner:** Tatsuya Suzuki (Principal), Masanobu Nogami,  
Koichiro Takao

## ***Sunday, July 16, 2017***

**10:00 – 19:30**

**Registration** (in the lobby of Lanzhou Legend Hotel)

## ***Monday, July 17, 2017***

**8:00 – 9:00**

### **Opening ceremony including symposium photo (Yifu Science Hall, Lecture Theatre, 2nd floor)**

Chair: Wangsuo Wu (Lanzhou University) and Yuezhou Wei (Guangxi University)

#### **Opening address**

Wangsuo Wu (Dean of the school of nuclear science and technology, Lanzhou University, China)

Cheng Wang (President, Lanzhou University, China)

Zhifang Chai (Academician of the Chinese Academy of Sciences, Soochow University/ Institute of High Energy Physics, CAS, China)

### **Plenary Session (Yifu Science Hall, Lecture Theatre, 2nd floor)**

Chair: Yuezhou Wei (Guangxi University) and Masaki Ozawa (Tokyo Institute of Technology)

**9:00 – 9:30**

#### **Efficient removal of radionuclides from aqueous solutions using carbon nanomaterials**

Xiangke Wang (North China Electric Power University, China)

**9:30 – 10:00**

#### **Reduction and Resource Recycling High-level Radioactive Waste through Nuclear Transmutation Overview of the ImpACT Program**

Reiko Fujita (ImpACT Program Manager, Japan Science and Technology Agency, Japan)

**10:00 — 10:30**

**What can Actinides Do for Metal-Organic Frameworks and What can Metal-Organic Frameworks Do for Actinides and Fission Products?**

Shuao Wang (Soochow University, China)

**10:30 — 11:00**

**Coffee break and poster session**

**11:00 — 11:30**

**New trends in technetium chemistry**

Konstantin German (Frumkin Institute of Physical Chemistry & Electrochemistry, Russian Academy of Sciences, Russia)

**11:30 — 12:00**

**Tailored MOFs for High Efficient Actinide Capture from Aqueous Solution**

Weiqun Shi (Institute of High Energy Physics, CAS, China)

**12:00 — 13:00**

**Lunch (Lanzhou Legend Hotel)**

**Session: Nuclear and radiochemistry related to nuclear fuel cycle  
(Yifu Science Hall, Lecture Theatre, 2nd floor)**

Chair: Shoujian Li (Sichuan University) and Masanobu Nogami (Kindai University)

**14:00— 14:18**

**Preparation of Amidoxime-based Adsorbent by Radiation-induced Graft Polymerization for the Adsorption of Uranium from the Aqueous Solution of Uranyl Tricarbonate**

Qingde Chen (Peking University, China)

**14:18— 14:36**

**Fundamental Study on Chemical and Radiation Stability of Triphosphine Trioxide Extractant**

Masanobu Nogami (Department of Electric and Electronic Engineering, Faculty of Science and Engineering, Kindai University, Japan)

**14:36 — 14:54**

**Selective Sorption of Strontium from Radioactive Wastewater with Potassium Hexatitanate Functionalized Silicic Inorganic Ion Exchanger**

Xinpeng Wang (Guangxi University, China)

**14:54— 15:12**

**HDEHO-CMPO/SiO<sub>2</sub>-P: a promising adsorbent for uranium recovery from sulfuric acid solutions**

Afshin Khayambashi (Shanghai Jiao Tong University, China)

**Session: Decommissioning of nuclear facilities and radioactive wastes disposal (Yifu Science Hall, Lecture Theatre, 2nd floor)**

Chair: Toshihiko Ohnuki (Tokyo Institute of Technology) and Zhijun Guo (Lanzhou University)

**15:12— 15:30**

**Employment of the generalized adsorption model for the prediction of solid-water distribution of cesium in the river-estuary-ocean system**

Qiaohui Fan (Lanzhou Center for Oil and Gas Resources, Institute Geology and Geophysics, CAS, China)

**15:30— 15: 48**

**Ultrafast estimation of radionuclides and heavy metal influence on halophilic bacteria inhabiting the polluted ecosystems**

Nadezhda Legkodimova (Medical University Reaviz – Moscow branch, Russia)

**15:48— 16:20**

**Coffee break and poster session**

**16:20 — 16:38**

**Adsorption of some radionuclides on Beishan Granite: Experimental and modelling study**

Zongyuan Chen (Lanzhou University, China)

**16:38 — 16:56**

**Effective and Efficient Removal of Cs from Clay Minerals for Volume Reduction of Radioactive Soil in Fukushima**

Xiangbiao Yin (Tokyo Institute of Technology, Japan)

**Session: Separation Chemistry of 4f/5f elements (Yifu Science Hall, Lecture Theatre, 2nd floor)**

Chair: Dongqi Wang (Institute of High Energy Physics) and Tatsuro Matsumura (Japan Atomic Energy Agency)

**16:56— 17:14**

**Complexation of NTAamide(C2) with Nd<sup>3+</sup> and Eu<sup>3+</sup> in Aqueous Solution**

Songdong Ding (Sichuan University, China)

**17:14— 17:32**

**Current status of R&D on reprocessing and minor actinide separation process with CHON ligands in JAEA**

Tatsuro Matsumura (Research Group for Partitioning, Nuclear Science and Engineering Center, Japan Atomic Energy Agency, China)

**17:32— 17:50**

**Formation and Fragmentation Chemistry of Tripositive Ln(TMGA)<sub>3</sub><sup>3+</sup>/Ln(TMTDA)<sub>3</sub><sup>3+</sup> Complexes in the Gas Phase**

Xiuting Chen (Shanghai Institute of Applied Physics, CAS, China)

**17:50— 18:08**

**Electronic structure and characterization of a uranyl di-15-crown-5 complex with an unprecedented sandwich structure**

Shuxian Hu (Tsinghua University, China)

**18:08— 18:26**

**A Review of Monazite Processing; From Mining to the Extraction of the Valuable Elements (Rare Earths, Th, and U)**

Sherif Ibrahim (Harbin Engineering University, China)

**Session: Advanced reprocessing and separation technologies (hydro and pyro) (Yifu Science Hall, Room 203, 2nd floor)**

Chair: Wenxin Li (Shanghai Institute of Applied Physics) and a Koichiro Takao (Tokyo Institute of Technology)

**14:00 — 14:18**

**Effect of Introduction of Simultaneous Adsorption System of PGMs and Mo from HLLW on Vitrification Process**

Kenji Takeshita (Tokyo Institute of Technology, Japan)

**14:18 — 14:36**

**A grading rule of equilibrium potentials of lanthanide alloys in nuclear fuel pyro processing**

Yongde Yan (Harbin Engineering University, China)

**14:36— 14:54**

**Microwave-Driven Solvent Extraction of Inert Platinum Group Metals from  $\text{HNO}_3(\text{aq})$  to Betainium-Based Ionic Liquid**

Koichiro Takao (Tokyo Institute of Technology, Japan)

**14:54 — 15:12**

**Sorption of scandium by impregnates in the processing of polymetallic raw materials**

Pyae Phyo Aung (D. Mendeleev University of Chemical Technology of Russia, Russia)

**Session: Basic chemistry of actinides and fission products (Yifu Science Hall, Room 203, 2nd floor)**

Chair: Chuanqin Xia (Sichuan University) and Tatsuya Suzuki (Nagaoka University of Technology)

**15:12 — 15:30**

**Separation and Recovery of LLFP from High-Level Radioactive by Ion Exchange Method**

Tatsuya Suzuki (Nagaoka University of Technology, Japan)

**15:30 — 15:48**

**The novel extractants, bis-triamides: synthesis and selective extraction of thorium(IV) from nitric acid media**

Chuanqin Xia (Sichuan University, China)

**15:48 — 16:20**

**Coffee break and poster session**

**15:48 — 16:20**

**DMRG Studies of the Highest Oxidation State of Pu in PuO<sub>4</sub> Molecule**

Junbo Lu (Tsinghua University, China)

**16:20 — 16:35**

**Spectroscopic Studies of U(VI) Retention in Mica and Granite Environment**

Duoqiang Pan (Lanzhou University, China)

**Session: Separation and Transmutation of fission products on resource ability (Yifu Science Hall, Room 203, 2nd floor)**

Chair: Shunyan Ning (Guangxi University) and Tetsuo Fukasawa (Hitachi-GE Nuclear Energy, Ltd)

**16:56— 17:14**

**Fluorination Treatment Method for the Fuel Debris Generated from Severe Accident of Nuclear Reactors**

Tetsuo Fukasawa (Hitachi-GE Nuclear Energy, Ltd., Japan)

**17:14— 17:32**

**Evaluation of Me<sub>2</sub>-CA-BTP/SiO<sub>2</sub>-P Adsorbent for the Separation of Minor Actinides from High Level Liquid Waste**

Shunyan Ning (Guangxi University, China)

**17:32— 17:50**

**Characterization of different bentonite and its application in the sorption of Cs and Sr from aqueous solution by bentonite-alginate microcapsules**

Fubin Lee (Department of Earth Science, National Cheng Kung University, Taiwan)

**17:50— 18:08**

**Sustainable Used Fuel Management in the Russian Federation**

Aleksandr Kiselev (JSC “TENEX”, Russia)

**18:08— 18:26**

**Separation of rare earth , thorium fluoride using precipitation-distillation coupled method in FLiNaK melts**

Haiying Fu (Shanghai Institute of Applied Physics, CAS, China)

**19:00 — 19:30**

**Invited talk on Silk roads and Dunhuang grottoes (Lanzhou Legend Hotel)**

Binglin Zheng (Dean of the school of history and culture, Lanzhou University, China)

**19:30 —**

**Welcome banquet**

***Tuesday, July 18, 2017***

**Session Invited Talk (Yifu Science Hall, Lecture Theatre, 2nd floor)**

Chair: Guoxin Tian (China Institute of Atomic Energy) and Kenji Takeshita (Tokyo Institute of Technology)

**8:00 – 8:25**

**Environmental Radiochemistry Study at PKU**

Chunli Liu (Peking University, China)

**8:25—8:50**

**R&D on Molten Salt Reactor Technologies in Japan**

Michio Yamawaki (Emeritus Professor, University of Tokyo, Japan; Vice President, Japan-China Science and Technology Exchange Association)

**8:50—9:15**

**Study of the close fuel cycle based on the accelerator driven system**

Zhi Qin (Institute of Modern Physics, CAS, China)

**9:15—9:40**

**From OMEGA, ORIENT to ImPACT, Technological Transition on Japanese P&T Programs**

Masaki Ozawa (Emeritus Professor, Tokyo Institute of Technology, Japan)

**9:40 – 10:00**

**Coffee break**

**10:00— 10:10**

**Closing of poster session (announcement of Best Poster award)**

**10:10 – 10:35**

**Transmutation of Key Fission Products and Transuranic in Partitioning and Transmutation Fuel Cycle**

Jor-shan Choi (UC Berkeley Nuclear Research Center, USA)

**10:35 — 11:00**

**Sorption of Pentavalent Neptunium on microbe pure culture and consortia**

Toshihiko Ohnuki (Tokyo Institute of Technology, Japan)

**11:00 — 11:25**

**Electrochemical Extraction of La on Cu Electrode in LiCl-KCl Eutectic**

Wei Han(Harbin Engineering University, China)

**11:25 — 11:50**

**Recovery of rare metals by sorption materials with a mobile phase of extractants**

Troshkina Irina D. (D. Mendeleev University of Chemical Technology of Russia, Russia)

**11:50— 12:15**

**Separation of Trivalent Actinides and Lanthanides Using Novel Silica-based 2,6-bis(5,6-dialkyl-1,2,4-triazin-3-yl)pyridine Adsorbent**

Yuezhou Wei (Guangxi University, China)

**12:15— 14:00**

**Lunch (Lanzhou Legend Hotel)**

**14:30 —**

**A visit in Institute of Modern Physics, CAS**

**17:00 —**

**Leave for technical tour**