

**Fourth NEA Information Exchange Meeting on
Nuclear Production of Hydrogen**
13-16 April 2009, Oakbrook, IL, USA

	Tuesday 14 April 2009
8:30 - 8:50	Registration for local and late-arrival participants <i>Note: Out-of town and overseas participants are recommended to register after arrival on Monday 13 April 2009 from 2:00 to 5:00 PM</i>
8:50 - 9:10	Welcome and Opening: John Herczeg(NEA Nuclear Science Committee), Carl Sink(DOE), Alan Sattelberger, Theodore Krause, David Wade(ANL), Yoshiyuki Nemoto(NEA)

	Tuesday 14 April 2009
	Session 1: Program Overviews
Time	Co-chair: Yoshiyuki Nemoto (NEA); Carl Sink (DOE)
9:10 – 9:30	Carl Sink (US-DOE): <i>Hydrogen Production Program in the U.S.</i>
9:30 – 9:50	Pascal Yvon, Philippe Carles and François Le Naour (CEA), France; <i>French research strategy to use nuclear reactors for hydrogen production</i>
9:50 – 10:10	M. Ogawa, R. Hino, Y. Inagaki*, K. Kunitomi, K. Onuki and H. Takegami, (JAEA), Japan; <i>Present Status of HTGR and Hydrogen Production Development in JAEA</i>
10:10 – 10:30	Coffee Break
10:30 – 10:50	Jonghwa Chang, Won-Jae Lee (KAERI), Korea; <i>Status of the Korean Nuclear Hydrogen Production Project</i>
10:50 – 11:10	N.Ponomarev-Stepnoy, A.Stolyarevskiy (RRC-KI), N.Kodochigov* (OKBM), Russian Federation: <i>The concept of nuclear hydrogen production based on MGR-T reactor</i>
11:10 – 11:30	Sam Suppiah, L. Stolberg, H. Boniface, G. Tan, S. McMahon and S. York, W. Zhang (AECL), Canada: <i>Canadian Nuclear Hydrogen R&D Program: Development of the Medium Temperature Cu-Cl Cycle and Contributions to the High Temperature Sulfur-Iodine Cycle</i>
11:30 – 11:50	Masao Hori (NSA), Japan: <i>Application of Nuclear Produced Hydrogen for Energy and Industrial Use</i>
11:50 – 12:10	Questions concerning all papers in the session
12:10 – 12:30	Panel Discussion: <i>Program Overviews</i> Panelists: Chairmen, presenters, additional panelists
12:30 – 2:00	Lunch: Luncheon talk by Linda Gaines (ANL): <i>"Using Nuclear Power to Fuel Our Vehicles"</i>

Revision 22 of April 27, 2009

	Tuesday 14 April 2009
	Session 2: High-Temperature Electrolysis
Time	Co-chair: Yoshiyuki Inagaki (JAEA); J. Stephen Herring (INL)
2:00 – 2:20	J. E. O'Brien, J. S. Herring, C. M. Stoots, M. G. McKellar, E. A. Harvego, K. G. Condie, G.K. Housley, J. J. Hartvigsen (INL), USA: <i>Status of the INL High-Temperature Electrolysis Research Program – Experimental and Modeling</i>
2:20 – 2:40	Julie Mougín, Georges Gousseau, Bertrand Morel, André Chatroux, Patrick Mayoussier, Patrick Le Gallo, Pierre Baurens, François Le Naour (CEA) Florent Chauveau, Jean-Claude Grenier, Jean-Marc Bassat, Fabrice Mauvy (univ. of Bordeaux), France: <i>High temperature steam electrolysis for hydrogen production: From materials development to stack operation</i>
2:40 – 3:00	S. Elangovan, J. Hartvigsen, F. Zhao, I. Bay, D. Larsen(Ceramatec), USA: <i>Materials Development for SOEC</i>
3:00 – 3:20	Magali Reytier, Jean-Luc Sarro, Jean-françois Juliaa (CEA), France: <i>A Metallic Seal for High Temperature Electrolysis Stacks</i>
3:20 – 3:40	Coffee Break
3:40 – 4:00	Vivek Inder Sharma, Bilge Yildiz (MIT), USA: <i>Degradation Mechanisms in Solid Oxide Electrolysis Anodes: Cr Poisoning and Cation Interdiffusion</i>
4:00 – 4:20	J. David Carter, Jennifer Mawdsley, A. Jeremy Kropf (ANL), USA: <i>Causes of Degradation in a Solid Oxide Electrolysis Stack</i>
4:20 – 4:40	Charles Forsberg and Mujid Kazimi (MIT),USA: <i>Nuclear Hydrogen Using High-Temperature Electrolysis and Light-Water Reactors for Peak Electricity Production</i>
4:40 – 5:00	Questions concerning all papers in the session
5:00 – 5:20	Panel Discussion: <i>High-Temperature Electrolysis</i> Panelists: Chairmen, presenters and additional panelists
5:20 – 7:00	Cash-bar reception

	Wednesday 15 April 2009
	Session 3: Thermochemical Sulfur Process
Time	Co-chair: Jonghwa Chang (KAERI); Robert Buckingham (GA)
8:30 – 8:50	P. Carles, X. Vitart, P. Yvon, (CEA), France : <i>CEA's assessment of the sulfur-iodine cycle for hydrogen production</i>
8:50 – 9:10	Benjamin Russ (GA), Robert Moore (SNL), Max Helie (CEA), France: <i>Status of the INERI Sulfur-Iodine Integrated-Loop Experiment</i>
9:10 – 9:30	R. Buckingham (GA), P. Lovera (CEA), P. Carles (CEA), L. Brown (GA), J. M. Borgard (CEA), , J. Leybros(CEA), P. Yvon (CEA), USA, France: <i>Influence of HTR Core Inlet and Outlet Temperatures on Hydrogen Generation Efficiency using the Sulfur-Iodine Water-Splitting Cycle</i>
9:30 – 9:50	Denis Doizi, Bruno Larousse, Vincent Dauvois, Jean Luc Roujou, Yoann Zanella, Pierre Fauvet, Philippe Carles, (CEA), France: <i>Experimental study of the vapour-liquid equilibria of HI-I₂-H₂O ternary mixtures</i>
9:50 – 10:10	Maximilian B. Gorenssek, Tommy B. Edwards (SRNL), USA: <i>Predicting the Energy Efficiency of a Recuperative Bayonet Decomposition Reactor for Sulfur-based Thermochemical Hydrogen Production</i>
10:10 – 10:30	Coffee Break
10:30 – 10:50	Kikwang Bae (KIER), Korea: <i>Development of HI decomposition process in Korea</i>
10:50 – 11:10	J.P. van Ravenswaay, F. van Niekerk, R.J. Kriek, E. Blom, H.C.M. Vosloo, WM.K. van Niekerk, F. van der Merwe (North-West Univ.), South Africa: <i>South Africa's Nuclear Hydrogen Production Development Program</i>
11:10 – 11:30	Jean Leybros, P. Rivalier, A. Saturnin*, S. Charton (CEA), France <i>Integrated laboratory scale demonstration experiment of the Hybrid Sulfur Cycle and preliminary scale-up</i>
11:30 – 11:50	William A. Summers (SRNL), USA : <i>Development Status of the Hybrid Sulfur Thermochemical Hydrogen Production Process</i>
11:50 – 12:10	Questions concerning all papers in the session
12:10— 12:30	Panel Discussion: <i>Thermochemical Sulfur Process</i> Panelists: Chairmen, presenters and additional panelists
12:30 – 2:00	Lunch : Luncheon talk by Jozef Misak (NRI-Rez): “ <i>The European Sustainable Nuclear Energy Technology Platform : its Status and Plans, including the Role of Future Nuclear Production of Hydrogen.</i> ”

Wednesday 15 April 2009	
	Session 4: Thermochemical Copper Chloride, and Calcium Bromide Processes
Time	Co-chair: Karl Verfondern (FZJ); Paul Pickard (SNL)
2:00 – 2:20	Greg Naterer (UOIT), Canada; <i>Recent Canadian advances in the thermochemical copper-chlorine cycle for nuclear-based hydrogen production</i>
2:20 – 2:40	Michele A. Lewis, Magali S. Ferrandon (ANL), David F. Tatterson (Orion Consulting Co.), USA: <i>An overview of R&D activities for the Cu-Cl cycle with emphasis on the hydrolysis reaction</i>
2:40 – 3:00	Denis Doizi, Jean Marc Borgard, Vincent Dauvois, Jean Luc Roujou, Yoann Zanella Laurence Croize, Philippe Carles, (CEA), France : <i>Study of the hydrolysis reaction of the Copper Chloride hybrid thermochemical cycle using optical spectrometries</i>
3:00 – 3:20	Coffee Break
3:20 – 3:40	Yanming Gong, Elena Chalkova, Mark V. Fedkin, Serguei N. Lvov* (Pennsylvania State Univ), USA: <i>Development of CuCl(aq)/HCl(aq) Electrolyzer for Hydrogen Production via Cu-Cl Thermochemical Cycle</i>
3:40 – 4:00	J.M. Borgard, D.Doizi (CEA), France : <i>Energy analysis of the CuCl hybrid cycle</i>
4:00 – 4:20	Richard D. Doctor, Jianhong Yang, C.B. Panchal (ANL), USA: <i>CaBr₂ hydrolysis for HBr production using a direct sparging contactor</i>
4:20 – 4:40	Questions concerning all papers in the session
4:40 – 5:00	Panel Discussion: <i>Thermochemical Copper Chlorine and Calcium Bromide Processes</i> Panelists: Chairmen, presenters and additional panelists.
5:00 – 7:00	Viewing of Poster Papers, Poster Sessions by: - Charles Forsberg (MIT) - Jozef Misak (NRI Rez) - Jonghwa Chang (KAERI) - Thomas Salles (AREVA) Cash-bar reception
7:00 – 8:30	Dinner: Dinner Talk by Franck Carre (CEA): <i>"Changing the World with Hydrogen and Nuclear – From past Successes to shaping the Future"</i>

Thursday 16 April 2009	
	Session 5; Economics and Market Analysis of Hydrogen Production and Use
Time	Co-chair: Franck Carré (CEA); Jan van Erp (ANL)
8:30 – 8:50	Ibrahim. Khamis (IAEA): <i>The Development of Hydrogen Economic Evaluation Programme (HEEP)</i>
8:50 – 9:10	Dan Keuter (Entergy), USA: <i>Nuclear H2 Production – A Utility Perspective</i>
9:10 – 9:30	Jérôme Gosset (AREVA), France : <i>Alkaline and High temperature electrolysis for nuclear Hydrogen production</i>
9:30 – 9:50	Karl Verfondern, Werner von Lensa (FZJ), Martin Roeb (ITT), Germany <i>The Production of Hydrogen by Nuclear and Solar Heat</i>
9:50 – 10:10	Paul Kruger (Stanford Univ.), USA: <i>Sustainable Electricity Supply in the World by 2050 for Economic Growth and Automotive Fuel</i>
10:10 – 10:30	Coffee Break
10:30 – 10:50	V. Blet, T. d'Aletto, J.C. Maguin (CEA), France: <i>PROHYTEC, The French industrial platform for massive hydrogen production</i>
10:50 – 11:10	Daniel Allen (Techn. Insights), Paul Pickard (SNL), Michael Patterson (INL), Carl Sink (DOE), USA: <i>NHI Economic Analysis of Candidate Nuclear Hydrogen Processes</i>
11:10 – 11:30	Audun Botterud (ANL), Bilge Yildiz (MIT), Guenter Conzelmann, Mark C. Petri (ANL): <i>Market Viability of Nuclear Hydrogen Technologies: Quantifying the Value of Product Flexibility</i>
11:30 – 11:50	Yukitaka Kato (TIT), Japan: <i>Possibility of Active Carbon Recycle Energy System</i>
11:50 – 12:10	Questions concerning all papers in the session
12:10 – 12:30	Panel Discussion: <i>Economics / Market Analysis of Hydrogen Production and Use</i> Panelists: Chairmen, presenters and additional panelists
12:30 – 2:00	Lunch:

	Thursday 16 April 2009
	Session 6: Safety Aspects of Nuclear Hydrogen Production
Time	Co-chair: Jozef Misak (UJV); Theodore Krause (ANL)
2:00 – 2:20	William Reckley (NRC), USA: <i>Nuclear Safety and Regulatory Considerations for Nuclear Hydrogen Production</i>
2:20 – 2:40	Nicholas R. Brown, Volkan Seker, Seungmin Oh, Shripad T. Revankar, Thomas J. Downar, Cheikhou Kane (Purdue Univ), USA: <i>Transient modeling of sulfur iodine cycle thermochemical hydrogen generation coupled to pebble bed modular reactor</i>
2:40 – 3:00	Nicholas R. Brown, Shripad T. Revankar, Volkan Seker, Thomas J. Downar (Purdue Univ), USA: <i>Proposed chemical plant initiated accident scenarios in a sulfur iodine cycle plant coupled to a pebble bed modular reactor</i>
3:00 – 3:20	Hiroyuki Sato, Nariaki Sakaba, Naoki Sano, Hirofumi Ohashi, Yukio Tachibana, Kazuhiko Kunitomi (JAEA) Japan: <i>Conceptual design of the HTRR-IS Nuclear Hydrogen Production System; Detection of the heat transfer tube rupture in Intermediate heat exchanger</i>
3:20 – 3:40	Alexander Mendoza-Acosta, Pamela F. Nelson and Juan-Luis Francois (UNAM), Mexico: <i>Use of PSA for Design of Emergency Mitigation Systems in a Hydrogen Production Plant, using General Atomics SI Cycle Technology, Section II "Sulfuric Acid Decomposition".</i>
3:40 – 4:00	Coffee Break
4:00 – 4:20	Satoshi Fukada, Yuki Edao (Kyushu University), Japan: <i>Heat pump cycle using hydrogen-absorbing-alloys in high temperature gas-cooled reactor for hydrogen production</i>
4:20 – 4:40	R.B. Vilim (ANL), USA: <i>Heat Exchanger Temperature Response for Duty-Cycle Transients in the NGNP/HTE</i>
4:40 – 5:00	R.B. Vilim (ANL), USA: <i>Alternate VHTR/THE Interface for Mitigating Tritium Transport and Structure Creep</i>
5:00 – 5:20	Questions concerning all papers in the session
5:20 – 5:40	Panel Discussion: <i>Safety aspects of nuclear hydrogen production</i> Panelists: Chairmen, presenters and additional panelists
5:40 – 6:00	Finalize Summary Statement Discuss whether to hold future meeting and when
6:00 – 6:20	Closing: Theodore Krause, David Wade (ANL), Yoshiyuki Nemoto (NEA)