

Reliability

- 5 projects running
- New proposals underway

Project R1 Non Destructive Evaluation & Mitigation; **NDE & Mitigation**

- COURBON Joël, Joel.courbon@insa-lyon.fr
- UCHIMOTO Tetsuya, uchimoto@ifs.tohoku.ac.jp

Shejuan Xie, PhD student at IFS, TU	MATEIS, INSA	Feb. 26 – Mar. 27, 2010	To work on pulsed eddy current for defect detection in the framework of internship program by GCOE
Tetsuya Uchimoto, IFS, TU	Annecy MATEIS	Mar. 13-20, 2010	To participate to ELYT annual meeting
Kazuhiro Ogawa, FRI, TU	MATEIS, INSA	Nov. 20-21, 2010	To define crept samples of of superalloy to be characterized
Tetsuya Uchimoto, IFS, TU	MATEIS, INSA	Dec. 13-16, 2010	To discuss joint work on EMAT-EC dual probe and future plans in the framework of JSPS program

Presentation and publication to:

International Seminar on Maintenance Science and Technology for Nuclear Power Plants (ISMST), Sendai, Nov. 3 2010 : presentation by T. Uchimoto on NDE of pipe wall thinning by EMAT-EC dual probe (joint work with T. Takagi IFS and Ph Guy INSA)

Tetsuya Uchimoto, Philippe Guy, Joel Courbon, Toshiyuki Takagi, EMAT-EC dual probe for evaluation of pipe wall thinning, NDT & E International (to be submitted)





Th. Monnier

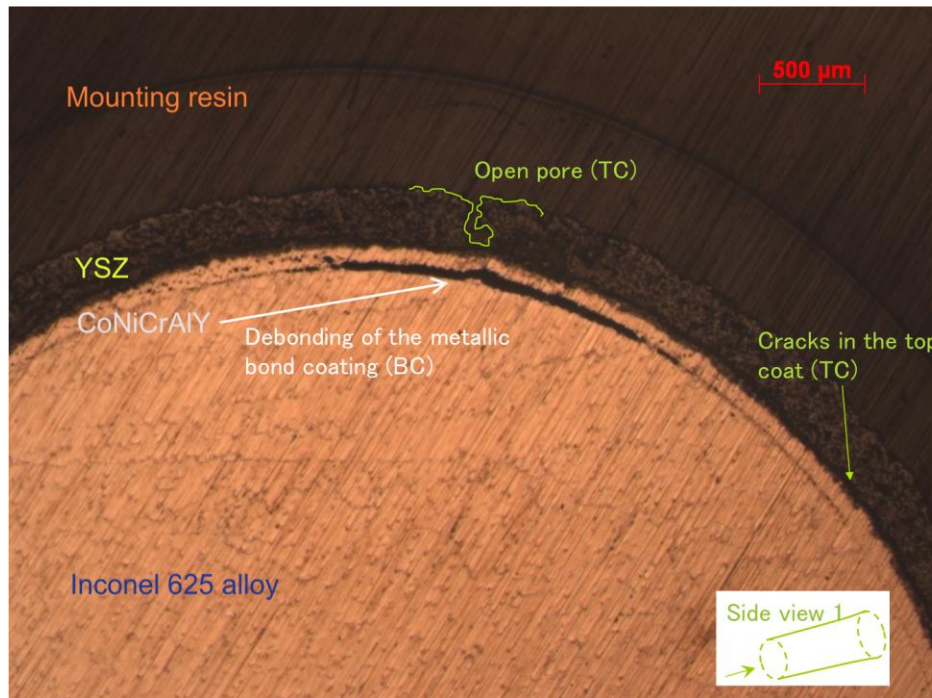
S. Deschanel

J. Courbon

T. Uchimoto

T. Takagi

K. Ogawa



acoustic microscopy of high-temperature damage of thermal barrier coatings

Future plans

Prospective contact with EDF Hydroelectricity to work together on pipe thinning (INSA and Tohoku Univ.)

10 month stay of T. Uchimoto at INSA

EMAT development, evaluation of fatigue and plastic deformation via multi-physics approach, electromagnetic modeling of composite materials

Project R2; Self-powered and Wireless Smart Systems; **SPWSS**

- Guyomar Daniel, Daniel.guyomar@insa-lyon.fr
- Sebald Gaël, Gael.Sebald@insa-lyon.fr
- Kuwano Hiroki, Hiroki.Kuwano@nanosys.mech.tohoku.ac.jp

Gael Sebald, Associate professor at INSA	Dept Mech Eng, TU	10 month stay	Invited JSPS researcher fellowship
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Presentation and publication to:

Proc. Internat. Conf. on Adaptative Structures and Technologies, Hong-Kong, July 2009 : Energy harvester of 1.5 cm³ giving output power of 2.6 mW with only 1g acceleration, D. Guyomar, G. Sebald, H. Kuwano

Patent applied





Daniel Guyomar



Hiroki Kuwano



Gaël Sebald

- Complementary skills between TU and INSA may result in major milestones in the framework of autonomous self-power and wireless sensors networks. In addition, a lot of fundamental questions are being investigated.

R3; Understanding and Managing SCC; UMaSCC

Bernard Normand, Bernard.normand@insa-lyon.fr

Yutaka Watanabe, yutaka.watanabe@qse.tohoku.ac.jp

2010-2011 activities of R3-UMaSCC

On-Going Research Tasks

- a. Compositional design for improved SCC resistance of Ni base alloys based on understanding Cr effects on film properties and SCC susceptibility, B. Normand, Y. Watanabe, et al.
- b. Contribution in SCC mechanism of Zircalloy under iodine environment or halide solution, M. Fregonese, E. Durif, V. Françon, Y. Watanabe, et al.
- c. Radiolysis effect study on SCC of stainless steels by using sonochemistry, O. Lavigne, T. Shoji, et al.

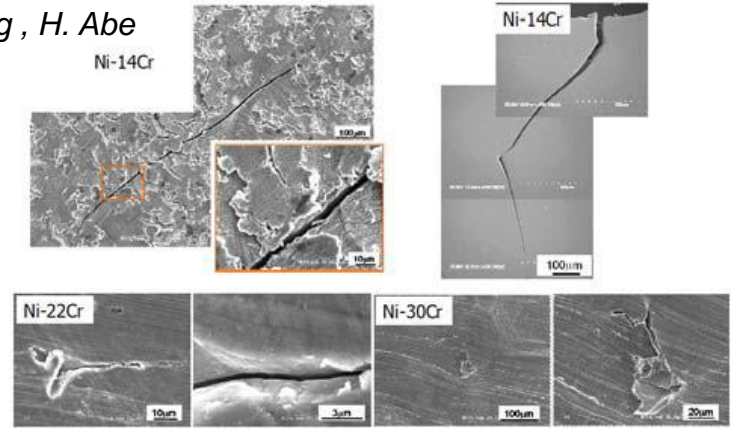
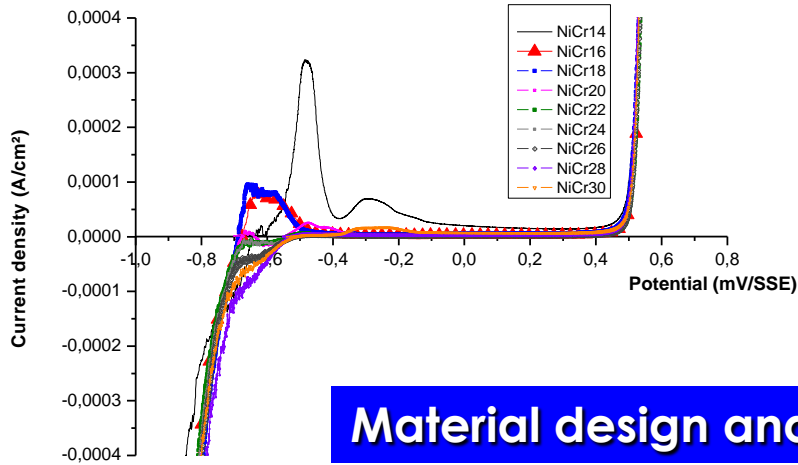
Thesis and Joint Publication

- ✓ V. Françon, PhD thesis to be submitted in this spring.
- ✓ V. Françon, M. Fregonese, H. Abe, Y. Watanabe, K. Niang, P. Barberis, “Iodine-Induced Stress Corrosion Cracking of Zircaloy-4: Identification of Critical Parameters Involved in Intergranular to Transgranular Crack Propagation”, 4th Int. Conf. Environmental Degradation of Engineering Materials, (May, 2011)

Main results of Understanding and Managing SCC subproject (UMaSCC)



Cr optimization for resistance to oxidation-induced cracking, H. Abe



Material design and selection

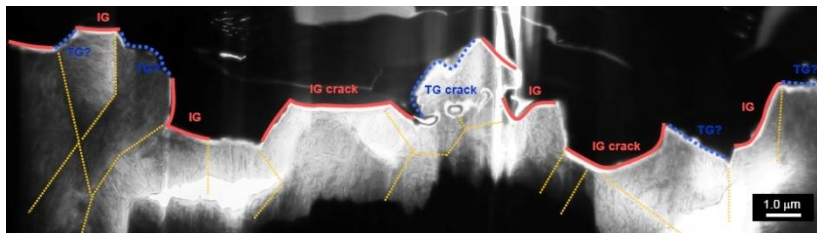
H. Mendy's Post Doctoral position



Performance indices

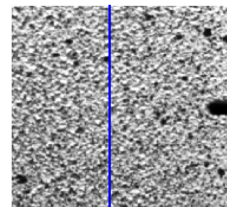
Characteristics

Material performances (SCC)

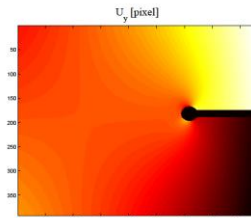
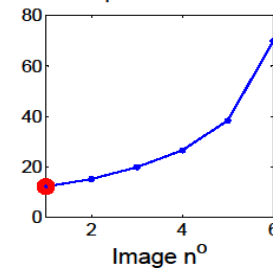


V. Françon's PhD Thesis

Crack tip detection



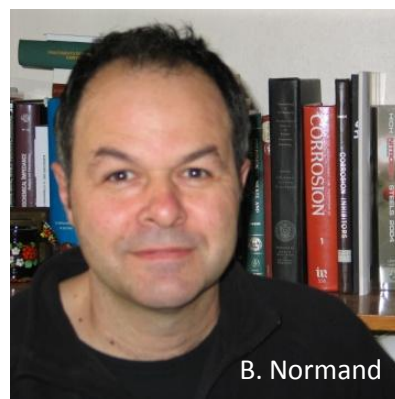
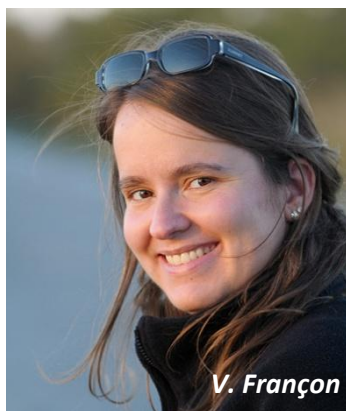
K_I [MPa.m^{1/2}]



E. Durif's PhD Thesis

Inventory of personnel exchange through R3-UMaSCC

Name and lab	Lab of stay	Budget	Period	Subject, aim of the stay
Y. Watanabe, GSE	MATEIS, B. Normand	15 k€	June-July 2008	Initiation of cooperation
V. Françon, MATEIS	GSE, Y. Watanabe	10 k€	April-May 2009	TEM observation and analysis on iodine-induced SCC of Zircaloy-4
O. Lavigne, MATEIS	FRI, T. Shoji		Nov. 2009 - present	Post doctoral contract – Simulation of water radiolysis by sonochemistry



Project R4- Polymer Aging (coating and cable applications). **PolymIrrad**

- CHAZEAU, laurent.chazeau@insa-lyon.fr
- KUBO Momoji, momoji@aki.che.tohoku.ac.jp

JY Cavaillé	FRI, M Kubo & T. Shoji	FRI, TU	Oct 19 - Nov 4, 2010	Participation to the PMDM meeting. ELyT school. Participation to the 7 th ICFD
Tetsuo Shoji	MATEIS	FRI, TU	Nov 24-26, 2010	Joint collaborations with MATEIS
Tetsuo Shoji	INSA	INSA, MATEIS	Jan 26-28, 2011	Dr Honoris Causa ceremony. Corrosion Day
Laurent Chazeau	FRI, M Kubo & T. Shoji	FRI, TU	Feb 7-March 6, 2011	Joint work on degradation modeling by molecular simulation.
JY Cavaillé	FRI, M Kubo & T. Shoji	FRI, TU	Feb 11-26, 2011	Joint work on degradation modeling by molecular simulation. See also project R5

Participation to:

- **Proactive Material Aging Management Group Meeting** (Proactive Materials Degradation Management, PMDM, Tohoku-Hokkaido Research Cluster of NISA Project).
- **3rd FRRI International Workshop on Evaluation of Environmental Degradation of Materials and Proactive Aging Management**, head by T. Shoji.
- **Collaboration with the Material Research Institute (MAI, directed by Dr Jan van der Lee**, involving EDF, TEPCO and EPRI (for Electrical Power Research Institute - USA)





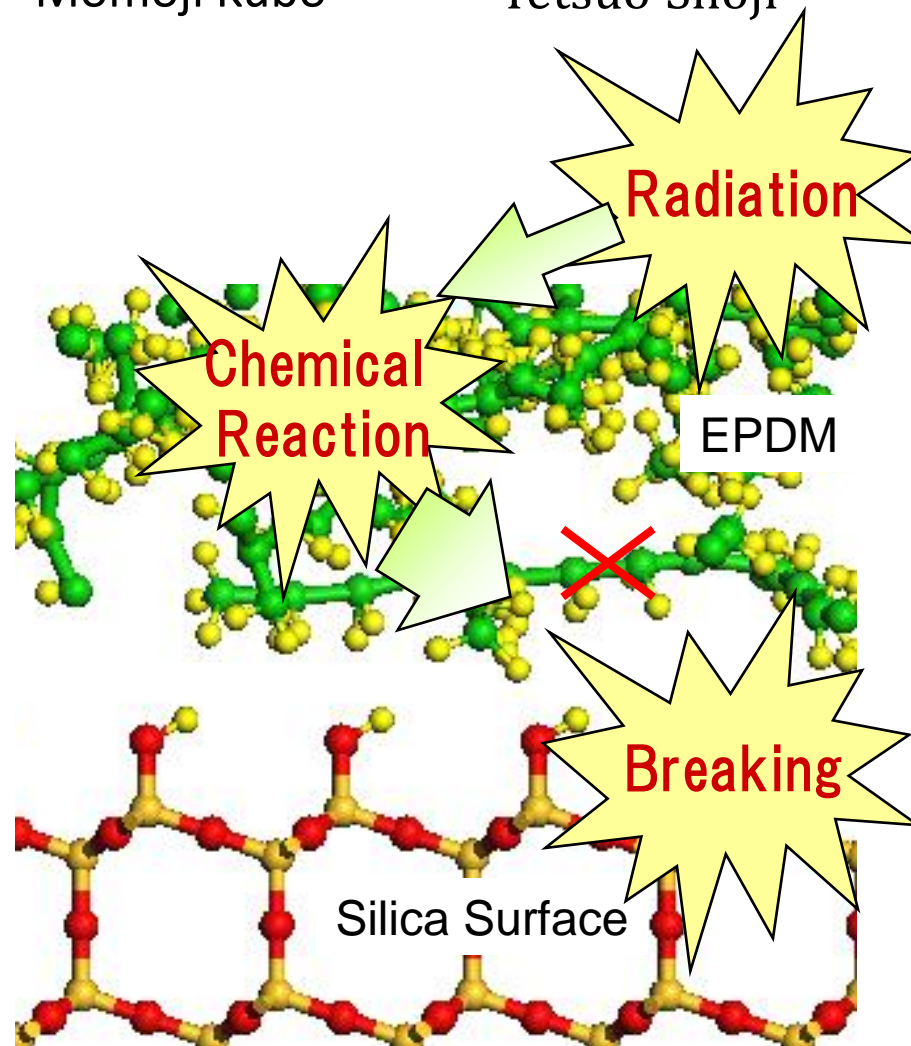
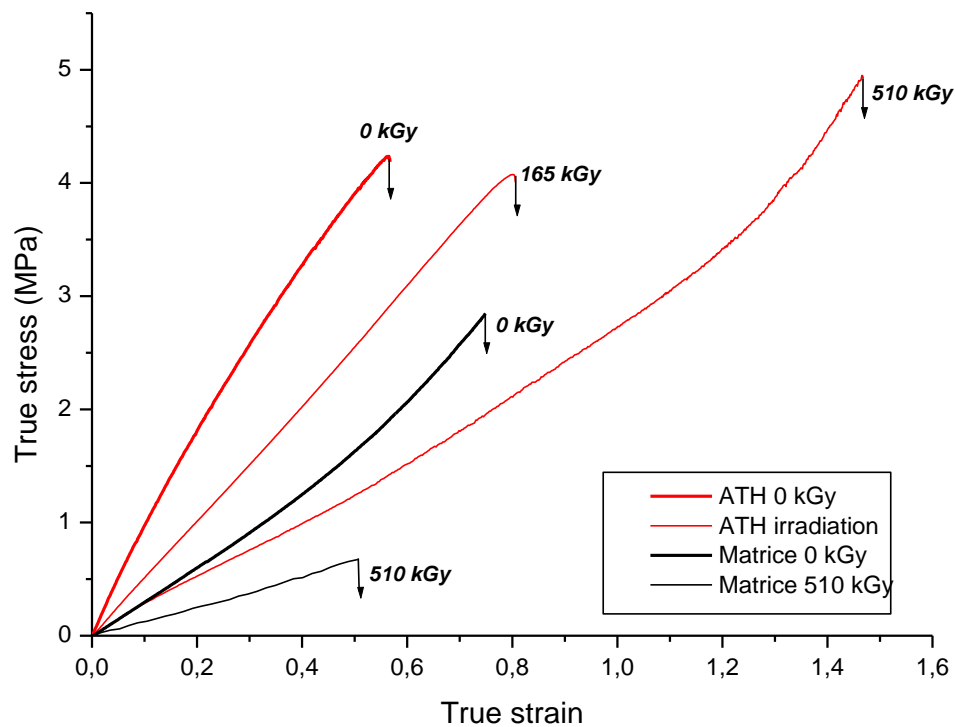
Laurent Chazeau

Jean-Yves Cavallé

Momoji Kubo

Tetsuo Shoji

Tensile tests performed on irradiated EPDM and ATH filled EPDM



R5-Metallic Coating processed by Cold Spray; **Cold spray**

On-going research program

“Computational simulation for cold sprayed deposition”

Prof. Alain Combescure (INSA), Prof. Daniel Nélias (INSA)

Assist. Prof. Hélène Walter Le Berre (INSA), Ph.D student Jing Xie (INSA)

Assoc. Prof. Kazuhiro Ogawa (TU), Assist. Prof. Yuji Ichikawa (TU)

Ph.D student Abreeza Manap (TU)

Personnel exchange

The PHD student Xie Jing is working on cold spray and would like to spend 2 or 3 stays of 2 months in tohoku within her PHD work



Daniel Nélias



Hélène Le Berre

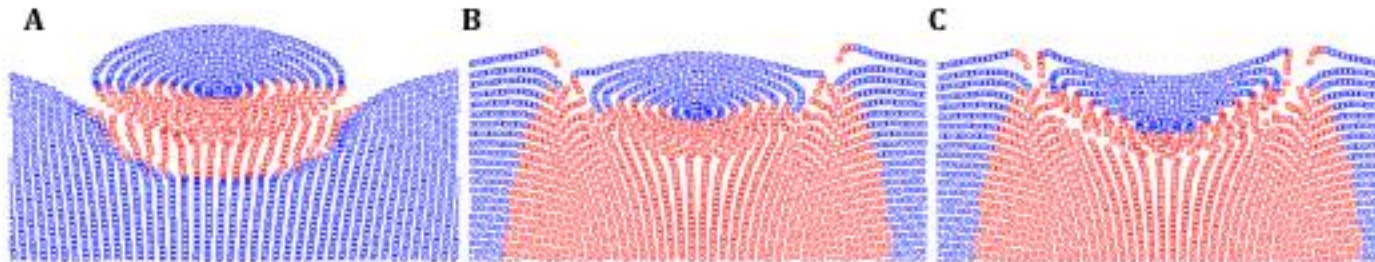


Kazuhiro Ogawa

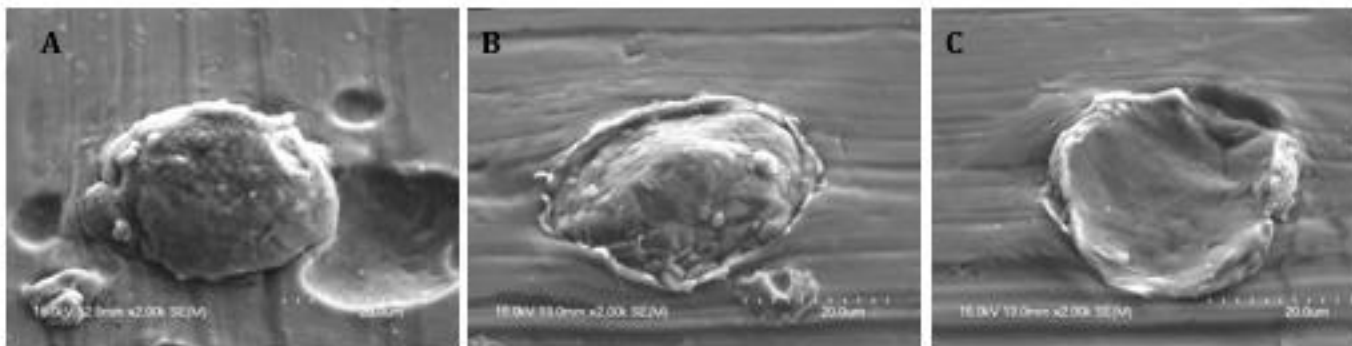


Alain Combescure

Deformation Behavior of cold sprayed deposition



SPH SIMULATION OF DEFORMED ALUMINUM POWDER PARTICLES IMPACTED AT A) 700 M/S B) 780 M/S AND C) 840 M/S ON ALUMINUM SUBSTRATE



SEM IMAGES OF DEFORMED ALUMINUM POWDER PARTICLES (45° ANGLE TILTED VIEW) IMPACTED AT A) 700 M/S B) 780 M/S AND C) 840 M/S ON ALUMINUM SUBSTRATE

SPH simulation agrees with experiment