

**Minutes of the EFC Working Party 3 Meeting**  
**Corrosion by Hot Gases and Combustion Products**  
**September 9<sup>th</sup>, 2008, EUROCORR 2008, Edinburgh, UK**

**1. Opening and welcome**

Meeting was opened at 17:30 by the chairman, Prof. Schütze, from DECHEMA. Prof. Schütze welcomes the attendees and discusses the points of the agenda by means of a presentation, which is enclosed as an attachment to these minutes. The agenda is accepted as-is.

**2. Three-year work programme of the Working Party**

The three-year work programme of the Working Party is discussed, including meetings, sessions, websites, EU projects, standards and publications. The full list is provided in the attachment to these minutes.

Two highlights are an EFC workshop “Solutions for high temperature corrosion protection in energy conversion systems” on October 1<sup>st</sup> and 2<sup>nd</sup>, 2009 at DECHEMA in Frankfurt am Main, and the fact that there will probably be a two-day session on high temperature corrosion at the EUROCORR 2009 conference in Nice. Furthermore, a session on high temperature corrosion in nuclear systems is planned for EUROCORR 2009 together with EFC Working Party 4 and the NACE committee for this topic.

**3. High temperature corrosion events in 2008 and later.**

Prof. Schütze presents a list of events which are of interest for people involved in high temperature corrosion. The list is included in the attachment to these minutes.

Additional meetings, suggested by the audience, include:

216<sup>th</sup> ECS meeting in Vienna, Austria, 4-9 October 2009

Gas turbine conference, organised by Novacek (venue unknown)

A conference in Prague on corrosion, to be held in 2010 (date not yet known).

**4. EFC Workshop “Solutions for high temperature corrosion protection in energy conversion systems” in Frankfurt am Main on 1-2 October 2009.**

This workshop is being held at DECHEMA, flyers have been handed out to all participants. Additional information is available via <http://events.dechema.de/efews09.html>, where abstracts have to be submitted before March 31<sup>st</sup>, 2009.

## **5. Standardisation activities**

-CEN

-ISO

Prof. Schütze remarks that there are virtually no standards for high temperature testing, just some guidelines. A few years ago a new initiative was therefore started to extend these guidelines and to develop new draft standards within the ISO framework. These initiatives are listed in the attachment.

## **6. Framework VII**

-Inclusion of HTC research

-Competence Centres / ERA net

-Other aspects

The EU research proposals submitted in 2007 are discussed. Corrosion in general does not seem to be highly appreciated as an interesting research topic by the EC. Only one out of six proposals was accepted (see the attachment for a list of all proposals). The reason for this may be that the proposals were too diverse. Prof. Schütze emphasizes that it is important to influence new calls and keep trying. Ing. Erik Schuring (schuring@ecn.nl) from ECN has several ideas for future corrosion research, which he will send to the chairman.

## **7. Further items to be raised by WP members**

No further items are brought forward.

## **8. Any other business**

The chairman thanks the attendants for their input and invites everyone to come up with ideas for future activities within the EFC.

Meeting closed at 18:05

The next WP-meeting will be held during EUROCORR 2009, 6-10 September 2009 in Nice

### Actions:

Ing. Schuring: send ideas for new EU projects on high temperature corrosion to Prof. Schütze

*Chretien Hermse*

Meeting of EFC WP3  
“Corrosion by Hot Gases and Combustion Products“  
9 September 2008, EUROCORR 2008, Edinburgh, Scotland

List of Participants

Hendrik J. **De Bruyn**  
Borealis A/S  
Stathelle, Norway  
E-mail: hennie.debruyn@boerealis.com

Prof. Dr. Vladimir **Cihal**  
VSB-Technical University of Ostrava  
Ostrava-Poruba, Czech Republic  
E-mail: vladimir.cihal@vsb.cz

Josef **Cizner**  
SVUM A.S.  
Research Centre Bechovice  
Prague, Czech Republic  
E-mail: cizner@svum.cz

Prof. Ferdinand **Haider**  
Universität Augsburg  
Lehrstuhl für Experimentalphysik II  
Augsburg, Germany  
E-mail: ferdinand.haider@physik.uni-augsburg.de

Dr. Peter **Heimgartner**  
Sulzer Markets & Technology AG  
Sulzer Innotec  
Winterthur, Switzerland  
E-mail: peter.heimgartner@sulzer.com

Dr. Chretien **Hermse**  
TNO Science and Industry  
Eindhoven, Netherlands  
E-mail: chretien.hermse@tno.nl

Kare **Johansson**  
StatoilHydro  
Tjeldbergodden  
Kjörsvikbugen, Norway  
E-mail: kajo@statoilhydro.com

Dr. Melanie **Montgomery**  
Technical University of Denmark - DTU  
Materials Science and Engineering  
Lyngby, Denmark  
E-mail: mmon@mek.dtu.dk

Dr. Rachel **Pettersson**  
Outokumpu Stainless AB  
Avesta, Sweden  
E-mail: rachel.pettersson@outokumpu.com

Dr.-Ing. Hanna **Pokhmurska**  
TU Chemnitz  
Institute of Composite Materials and Surface Technology  
Chemnitz, Germany  
E-mail: hanna.pokhmurska@mb.tu-chemnitz.de

Dr. Simon **Rose**  
Pilkington Brothers Ltd.  
Surface Analysis & Metallurgy  
Lathom Lancs, Great Britain  
E-mail: simon.rose@pilkington.com

Petr **Sajdl**  
ICT Prague  
Power Engineering  
Prague, Czech Republic  
E-mail: sajdlp@vscht.cz

Dr. Miguel **Sanchez Pasten**  
Instituto Politecnico Nacional, ESIQIE  
Dept. de Ingenieria Quimica Ind., UPALM  
Mexico, Mexico  
E-mail: msanchezpa@ipn.mx

Dr. Robert **Sauerbrey**  
RHI AG  
Technologiecenter Leoben  
Leoben, Austria  
E-mail: robert.sauerbrey@rhi-ag.com

Prof. Dr.-Ing. Michael **Schütze**  
DECHEMA e.V.  
Karl-Winnacker-Institut  
Frankfurt, Germany  
E-mail: schuetze@dechema.de

Ing. Erik W. **Schuring**  
ECN-Engineering & Services  
Petten, Netherlands  
E-mail: schuring@ecn.nl

Dr. Barbara **Waldmann**  
Corrmoran GmbH  
Augsburg, Germany  
E-mail: barbara.waldmann@corrmoran.de

Prof. David **Young**  
University of New South Wales  
School of Materials Science and Engineering  
Sydney, Australia  
E-mail: d.young@unsw.edu.au

# EFC Working Party 3:

Corrosion by Hot Gases and Combustion Products

Business Meeting at EUROCORR 2008 in Edinburgh, UK

on 9 September 2008

Beginning: Immediately following the session on High Temperature Corrosion Processes (~6:00 pm)

Location: same room as scientific session  
(Moorfoot Hall)

## AGENDA

1. Opening and welcome
2. Three-year work programme of the Working Party
3. High temperature corrosion events in 2008 and later
4. EFC Workshop "Solutions for High Temperature Corrosion Protection in Energy Conversion Systems" in Frankfurt/Main on 1-2 October 2009
5. Standardisation activities
  - CEN
  - ISO
6. Framework VII
  - Inclusion of HTC research
  - Competence Centres / ERA net
  - Other aspects
7. Further items to be raised by the WP members  
(Please send short information to [schuetze@dechema.de](mailto:schuetze@dechema.de) before the meeting.)
8. Any other business

End of the meeting: around 7:00 pm

**EFC WORKING PARTY REPORT PRO-FORMA (SEPTEMBER 2008)**  
**Working Party No. and Title: WP3 Corrosion by Hot Gases and Combustion Products**

**MAIN OBJECTIVES FOR THE NEXT THREE YEARS:**

To develop tools for a more precise assessment of high temperature corrosion resistance and for life-time prediction of materials and components under high temperature corrosion conditions.

**DETAILED MEASURES BY WHICH THE ABOVE OBJECTIVES WILL BE ACHIEVED**

(Please complete, as appropriate, using continuation pages if necessary)

No.	Type of Activity	Target Date(s)
1	<u>WP Meetings</u> (state expected attendance levels & business/technical split) Different types of meetings a)WP business meeting in conjunction with each future EUROCORR (20-30) b)WP technical workshops (60-100)	<b>annually</b> <b>every 2-3 years</b>
2	<u>Sessions at EUROCORR</u> (identify special topics): 2 day topical session at EUROCORR 2008 2 day workshop "Corrosion Issues in Future High Temperature Nuclear Systems" at EUROCORR 2009 together with WP4 1 or 2 day topical session on WP3 topics at EUROCORR 2009 depending on input	<b>2008</b> <b>2009</b> <b>2009</b>
3	<u>Cooperation with other WPs e.g. Joint Sessions at EUROCORR</u> (give details): See item 2	
4	<u>Maintenance of a WP page on the <a href="http://www.EFCWEB.org">www.EFCWEB.org</a> website:</u> Contribution to WP page has been installed and is being kept up-to-date.	
5	<u>Contributions to the EFC Newsletter:</u> Can be offered on request.	
6	<u>Organisation of EFC Workshops/Courses/Meetings, etc</u> (give details): Several workshops have been organised in the past (see also item 10: books from the workshops). The call-for-papers for the next workshop on 1-2 October 2009 entitled "Solutions for High Temperature Corrosion Protection in Energy Corrosion Systems" has been issued.	<b>2009</b>

**EFC WORKING PARTY REPORT PRO-FORMA (SEPTEMBER 2008)**  
**Working Party No. and Title: WP3 Corrosion by Hot Gases and Combustion Products**

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- 7 Organisation of Collaborative Research or Testing Programmes (give details)  
See item 8 and EFC series book no. 53.
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Participation in EU-supported Projects (give details)

In the 7th Framework Programme of the EU the following proposals were submitted:

- 1) RFS-PR-06093  
*Advanced materials for oxyfuel combustion of coal*  
Not retained for financial support
- 2) CP-FP 214302-1  
*Nanoscale surface modification to suppress environmental embrittlement of titanium aluminide alloys*
- 8 Failed to pass one threshold in the first evaluation round **2008**
- 3) CP-IP 211329-1  
*New multipurpose coating systems based on novel particle technology for extreme environments at high temperature*  
Successful in the first round, successful in the second evaluation round, starting date October 2008
- 4) CP-IP 213541-1  
*Tailored materials to resist in severe environments*  
Successful in the first round, failed in the second evaluation round
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Participation in the Development of Standards (give details)

Presently under work:

- ISO/TC 156 CD 21608  
Corrosion of Metals and Alloys – Test Method for isothermal exposure testing under high temperature corrosion conditions for metallic materials
  - New document as NWIP
- 9 Corrosion of metals and alloys – Test method for thermal cycling exposure testing under high temperature corrosion conditions for metallic materials **2008**
- ISO/TC 156 NWI 5092005  
Corrosion of metals and alloys – Method for metallographic examination of samples after exposure to high temperature corrosive environments  
The ISO/TC 156 secretariat was moved from Moscow to Beijing leading to a severe delay in the activities of this TC. It is planned to restart the work of WG 13 in autumn 2008.
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**EFC WORKING PARTY REPORT PRO-FORMA (SEPTEMBER 2008)**  
**Working Party No. and Title: WP3 Corrosion by Hot Gases and Combustion Products**

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Preparation of Publications for the EFC Series of Books (give details)

EFC41: "Corrosion by Carbon and Nitrogen – Metal Dusting, Carburisation and Nitridation" edited by M. Schütze and H.J. Grabke, published

EFC47: "Novel Approaches to the Improvement of High Temperature Corrosion Resistance" edited by M. Schütze and W.J. Quadackers (EFC WP3 on Corrosion in Hot Gases and Combustion Products), published

10 EFC 52: "The First 50 Years of the EFC" edited by Jörg Vogelsang and Paul McIntyre (EFC Science and Technology Advisory Committee), WP3 contribution submitted **2008**

EFC 53: "Standardisation of thermal cycling exposure testing" edited by M. Schütze & M. Malessa, published

EFC 57: "Protective Systems for High Temperature Applications: From Theory to Industrial Implementation" edited by M. Schütze and W.J. Quadackers, publication status: Refereeing process finished, papers have been sent to the series editor Paul McIntyre..

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11 Other(s) (please specify)

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"Hot News" (e.g. Particular problems, highlights of activity during the past 12 months, or other newsworthy items)

12 WCO-Workshop: Needs for Corrosion Research to Solve Global Future Problems in Edinburgh on 11 September 2008 at EUROCORR 2008: Contribution of WP 3 "Technology driven needs for future high temperature corrosion research", Michael Schütze

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# High Temperature Corrosion – List of Events 2008

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NACE Corrosion Technology Week 14-18 September 2008, Salt Lake City, USA	<a href="http://events.nace.org/technical/ctw2k8">http://events.nace.org/technical/ctw2k8</a>
7th International Conference on Microscopy of Oxidation 15-17 September 2008, Chester, UK	<a href="http://www.liv.ac.uk/engdept/conferences/moo_07.htm">www.liv.ac.uk/engdept/conferences/moo_07.htm</a>
4th IMR Symposium on Materials Sciences and Engineering – High Temperature Corrosion and Protection of Materials 23-26 September 2008, Shenyang, China	<a href="http://english.imr.ac.cn/IMRWeb/eng">http://english.imr.ac.cn/IMRWeb/eng</a>
Materials Science & Technology (MS&T); 95th Annual ASM International Meeting 5-9 October 2008, Pittsburgh, USA	<a href="http://www.matscitech.org/2008">www.matscitech.org/2008</a>
17th International Corrosion Congress 6-10 October 2008, Las Vegas, Nevada, USA	<a href="http://www.nace.org">www.nace.org</a>
Pacific Rim Meeting on Electrochemical and Solid-State Science (PRIME) 12-17 October, Honolulu, Hawaii	<a href="http://www.electrochem.org">www.electrochem.org</a>
SACNUC Workshop on Sulphur-Assisted Corrosion in Nuclear Disposal Systems 21-23 October 2008, Brussels, Belgium	<a href="http://www.sckcen.be/sacnuc">www.sckcen.be/sacnuc</a>
KORSEM08 – 11th International Corrosion Congress 22-25 October 2008, Izmir, Turkey	<a href="http://web.deu.edu.tr/korsem08izmir">http://web.deu.edu.tr/korsem08izmir</a>
DIMAT 2008 – 7th International Conference on Diffusion in Materials 28-31 October 2008, Lanzarote, Spain	<a href="http://www.ucm.es/info/tuma/quimicas_superficie/congresos.html">www.ucm.es/info/tuma/quimicas_superficie/congresos.html</a>
GfKORR Jahrestagung „Instandhaltung und Korrosionsschutz: Zwei Welten – Ein Ziel?“ 11-12 November 2008, Frankfurt am Main, Germany	<a href="http://www.gfkorr.de">www.gfkorr.de</a>

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# High Temperature Corrosion – List of Events

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MRS Fall Meeting 1-5 December 2008, Boston, USA	<a href="http://www.mrs.org">www.mrs.org</a>
TMS 2009 Annual Meeting 15-19 February 2009, San Francisco, USA	<a href="http://www.tms.org/Meetings/Annual-09/AnnMtg09Home.html">www.tms.org/Meetings/Annual-09/AnnMtg09Home.html</a>
CORROSION 2009 / NACE Conference and Exhibition 22-26 March 2009, Atlanta, USA	<a href="http://www.nace.org">www.nace.org</a>
International Conference on Metallurgical Coatings And Thin Films (ICMCTF) 28 April – 2 May 2009, San Diego, USA	<a href="http://www.avs.org">www.avs.org</a>
Plansee Seminar: International Conference on High Performance P/M Materials 25-30 May 2009, Reutte, Austria	<a href="http://www.plansee-group.com/plansee_seminar_ENG_HTML.htm">www.plansee-group.com/plansee_seminar_ENG_HTML.htm</a>
Gordon Research Conference on High Temperature Corrosion 26-31 July 2009, New London, USA	<a href="http://www.grc.org/programs.aspx?year=2009&amp;program=hightemp">www.grc.org/programs.aspx?year=2009&amp;program=hightemp</a>
International Conference on Processing & Manufacturing of Advanced Materials (THERMEC' 2009) 25-29 August 2009, Berlin, Germany	<a href="http://www.thermec.uow.edu.au">www.thermec.uow.edu.au</a>
EFC Workshop: Solutions for High Temperature Corrosion Protection in Energy Conversion Systems 1-2 October 2009, Frankfurt am Main, Germany	<a href="http://www.dechema.de/efcws09">www.dechema.de/efcws09</a>
EUROCORR 2009: "Corrosion: from the Nanoscale to the Plant" 6-10 September 2009, Nice, France	<a href="http://www.eurocorr.org">www.eurocorr.org</a>
EUROCORR 2010 13-17 September 2010, Moscow, Russia	<a href="http://www.eurocorr.org">www.eurocorr.org</a>

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# Status of Corrosion-Related Projects Submitted for Support under the EC's 7<sup>th</sup> Framework Programme (Sept. 2008)

## 1) RFS-PR-06093

*Advanced materials for oxyfuel combustion of coal*

Not retained for financial support

## 2) CP-FP 214302-1

*Nanoscale surface modification to suppress environmental embrittlement of titanium aluminide alloys*

Failed to pass one threshold in the first round

## 3) CP-IP 211329-1

*New multipurpose coating systems based on novel particle technology for extreme environments at high temperature (PARTICOAT)*

Successful in the first and second round, starting date October 2008

## 4) CP-IP 213541-1

*Tailored materials to resist in severe environments*

Successful in the first round, failed in the second evaluation round



# Status of the standardisation activities in the area of High Temperature Corrosion

## ISO TC 156 WG 13

**Convenor:** Prof. M. Schütze (D)  
**Secretary:** Dr. S. Osgerby (UK)  
**Members:** Prof. V. Cihal (CZ)  
G. Engström (S)  
Dr. S. Ito (JP)  
Dr. Y. Kawahara (JP)  
Dr. M. Malessa (D)  
Prof. T. Maruyama (JP)  
Dr. P. McIntyre (UK)  
Prof. F. Perez-Trujillo (E)  
Dr. R. Pettersson (S)  
Dr. S. Taniguchi (JP)  
Dr. P. Tortorelli (USA)  
Dr. Ian Wright (USA)



Materials  
Chemical Engineering  
Biotechnology

# Draft Documents Presently Under Work

- **ISO/TC 156 CD 21608**  
Corrosion of Metals and Alloys – Test Method for isothermal exposure testing under high temperature corrosion conditions for metallic materials
- **ISO/TC 156 NWI 5092005**  
Corrosion of metals and alloys – Method for metallographic examination of samples after exposure to high temperature corrosive environments
- **ISO/TC 156 NWI XXXX (new document)**  
Corrosion of metals and alloys – Test method for thermal cycling exposure testing under high temperature corrosion conditions for metallic materials