BOOK OF ABSTRACTS IVWFC 2021

Online workshop dedicated entirely to fuel cells and electrolyzers, entitled *"Italian Virtual Workshop on Fuel Cells"* (IVWFC 2021). IVWFC 2021 will host **ONLY invited oral contributions** in the different fields of fuel cell/electrolyzers science and technology. The presentations will be delivered **both from national and international specialists**.

SCIENTIFIC COMMITTEE

Vincenzo Baglio, Paola Costamagna, Vito Di Noto, Alessandro Lavacchi, Mariangela Longhi, Piercarlo Mustarelli, Isabella Nicotera, Monica Santamaria, Stefania Specchia

ORGANIZING COMMITTEE

Enrico Negro (co-chair), Carlo Santoro (co-chair), Elisabetta Di Bartolomeo, Vito Di Noto, Piercarlo Mustarelli

PLENARY SPEAKERS

Andrew Herring, John Irvine, Frédéric Jaouen, Radenka Maric, Mogens Mogensen, Deborah Myers, Vojislav Stamenkovic

KEYNOTE SPEAKERS

Plamen Atanassov, Marian Chatenet, Lior Elbaz, Emiliana Fabbri, William Mustain, Iryna Zenyuk

ITALIAN VIRTUAL WORKSHOP ON FUEL CELLS 2021 (IVWFC 2021)

SCOPE OF THE WORKSHOP

Low-temperature and high-temperature fuel cells and electrolyzers: PEMFCs, AEMFCs, DAFCs, SOFCs. Functional materials for fuel cells: electrocatalysts (both based on Pt and "Pt-free") and electrolytes.

16-19 March 2021 (2-7 pm CET)

Website: **https://ivwfc.mater.unimib.it/**

LINK: https://unimib.webex.com/meet/carlo.santoro

Special Issue of **Electrochimica Acta**, Elsevier (I.F. = 6.215)
"And Yet Electrochemical Energy Storage and Conversion Moves in 2021" (EESC 2021)

PATRONAGE

ROYAL SOCIETY OF CHEMISTRY | ITALY LOCAL SECTION

UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA — DEPARTMENT OF MATERIALS SCIENCE, Via Roberto Cozzi, 55, I-20125 Milano (I)

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ISE International Society of Electrochemistry — REGIONAL DIVISION 3 DIVISION 4

Program
IVWFC 2021
16-19 March 2021

13.40 – 14.00
INTRODUCTION TO THE WORKSHOP

Prof. Enrico Negro
Dr. Carlo Santoro
Prof. Vito Di Noto

DAY 1: Tuesday March 16th 2021 2-7 pm CET

TOPICS:
SOFC and SOEC

Session 1 – Session Chair Di Bartolomeo

14.00 - 14.40 IRVINE
14.40 - 15.00 ASENSIO
15.00 - 15.20 DURANTI
15.20 - 15.40 SANNA
15.40 - 16.00 GIANNICI

16.00 - 16.15 **BREAK**

Session 2 – Session Chair Lo Faro

16.15 - 16.55 MOGENSEN
16.55 - 17.15 DOSA
17.15 - 17.35 CLEMATIS
17.35 - 17.55 FELLI

17.55 - 18.10 **BREAK**

Session 3 – Session Chair Costamagna

18.10 - 18.30 LO FARO
18.30 - 18.50 GONDOLINI
18.50 - 19.10 GANDIGLIO

19.10 - 19-20
AWARDS of the day

ORAL Evaluators

Bertei
Boaro
Costamagna
Di Bartolomeo
Lo Faro

DAY 2: Wednesday March 17th 2021 2-7 pm CET

TOPICS:
Electrooxidation reaction, DAFC and Low-Pt

Session 1 – Session Chair Negro

14.00 - 14.30 CHATENET
14.30 - 14.50 MATTAROZZI
14.50 - 15.10 BERRETTI
15.10 - 15.30 LO VECCHIO
15.30 - 15.50 ZAGO

15.50 - 16.05 **BREAK**

Session 2 – Session Chair Specchia

16.05 - 16.45 MARIC
16.45 - 17.05 ROSSETTI
17.05 - 17.25 FRACCHIA

17.25 - 17.40 **BREAK**

Session 3 – Session Chair Lavacchi

17.40 - 18.20 STAMENKOVIC
18.20 - 18.40 NALE
18.40 - 19.10 ZENYUK

19.10 - 19.20
AWARDS of the day

ORAL Evaluators

Baglio
Longhi
Mecheri
Miller
Negro

DAY 3: Thursday March 18th 2021 2-7 pm CET

TOPICS:
PGM-free

Session 1 – Session Chair Baglio

14.00 - 14.40 JAOUEN
14.40 - 15.00 FREITAS
15.00 - 15.20 GIURLANI
15.20 - 15.40 LONGHI

15.40 - 15.55 **BREAK**

Session 2 – Session Chair Santoro

15.55 - 16.25 MUSTAIN
16.25 - 16.45 PAGLIARO
16.45 - 17.05 DANIEL
17.05 - 17.35 ELBAZ

17.35 - 17.50 **BREAK**

Session 3 – Session Chair Longhi

17.50 - 18.30 MYERS
18.30 - 18.50 VASSALINI
18.50 - 19.10 MENGA

19.10 - 19.20
AWARDS of the day

ORAL Evaluators

Durante
Lavacchi
Navarra
Specchia
Vezzù

DAY 4: Friday March 19th 2021 2-7 pm CET

TOPICS:
Membrane, Modeling, Synchrotron measurements

Session 1 – Session Chair Santamaria

14.00 - 14.20 MAZZAPIODA
14.20 - 14.40 CARBONE
14.40 - 15.00 SIMARI
15.00 - 15.20 NARDUCCI

15.20 - 15.35 **BREAK**

Session 2 – Session Chair Nicotera

15.35 - 16.15 HERRING
16.15 - 16.35 ZAFFORA
16.35 - 16.55 BARICCI
16.55 - 17.15 BARBERA
17.15 - 17.45 FABBRI

17.45 - 18.00 **BREAK**

Session 3 – Session Chair Di Noto

18.00 - 18.20 FERRARA
18.20 - 18.50 ATANASSOV

18.50 - 19.00
AWARDS of the day

19.00 - 19.15 CLOSURE

ORAL Evaluators

Di Noto
Nicotera
Quartarone
Santoro
Santamaria

BOOK OF ABSTRACTS IVWFC 2021

Wednesday March 17th. 2-7 pm
Times are referred to CET

TOPICS: Electro-oxidation, direct alcohol fuel cell, low PGM catalysis

14.30-14.50. *17-March-2021.* ***INVITED TALK***

Activity of Pd-Ni Alloys Towards Ethanol Electro-Oxidation in Alkali: Is There any Synergy between Pd and Ni?

Luca Mattarozzi, Sandro Cattarin, Nicola Comisso, Paolo Guerriero, Marco Musiani, Lourdes Vázquez-Gómez

ICMATE-CNR, C.so Stati Uniti 4,35127-Padova, Italy

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Pd-based materials are attracting much interest as electrocatalysts in alkaline DAFC, due to intrinsic high activity and good stability of Pd in alcohol electro-oxidation [1]. Many articles propose anodes consisting of finely dispersed Pd and Pd-alloy particles supported on nanostructured carbonaceous materials to obtain high Pd area and low noble metal content, thereby ensuring high mass activity and low cost. Few cases are reported of Pd-Ni alloy anodes obtained by electrodeposition [2]. It is shown that alloying with Ni may warrant the catalyst stability in an alkaline environment, but the relation between composition and performances has received limited attention.

In this contribution, we present the preparation of several compact and porous Pd-Ni anodes, either homogeneous or heterogeneus, and their application to ethanol oxidation in alkaline media. Different morphologies and structures (obtained by several routes) are compared. The dimensionless parameter $f_{r,Pd}$ is defined as the ratio between the estimated areas A_{Pd} and A_{geom}, the former being measured by PdO reduction charge (for each sample) in CV experiments in alkali, and the latter by the PdO reduction charge for 1cm^2 of mirror-flat Pd. This $f_{r,Pd}$ parameter expresses the equivalent Pd surface per unit area, reducing to a traditional roughness factor f_r for pure Pd samples.

Oxidation peak currents j_p, recorded in anodic part of CV of ethanol oxidation, are plotted against the respective $f_{r,Pd}$ values. All the considered Pd-Ni samples show, despite different morphologies and compositions, an electrode activity proportional to $f_{r,Pd}$, namely to the Pd surface exposed to the electrolyte. This finding indicates that only the exposed Pd surface sustains the catalytic activity, whereas Ni atoms present both in the substrate and admixtures are essentially inert [3].

[1] C. Bianchini, P.K. Shen, *Chem. Rev.*, 109 (2009) 4183–4206.
[2] R. Li, H. Mao, J. Zhang, T. Huang, A. Yu, *J. Power Sources*, 241 (2013) 660–667.
[3] L. Mattarozzi, S. Cattarin, N. Comisso, R. Gerbasi, P. Guerriero, M. Musiani, L. Vázquez-Gómez, *Electrochim. Acta*, 307 (2019) 503–511.