

# CV MASSIMO SANTARELLI (Politecnico di Torino)

---

## 1. Personal data

Massimo Gian Luca SANTARELLI,

Mechanical Engineer. Ph.D. in Thermodynamics and Heat Transfer

Full Professor in Thermodynamics and Heat Transfer, Department of Energy, Politecnico di Torino

Affiliated Professor in KTH (Stockholm, Sweden).

Affiliated Professor in UIC (Chicago, IL, US).

## 2. Research career

Author of around 220 papers in international journals and conferences.

The main research activity is linked to the topic of electrochemical systems applied to energy (fuel cells, electrolyzers), power-to-chemicals (hydrogen, synthetic natural gas, ...), and their integration with renewable sources:

- polygeneration systems: experimental, modelling, demo
- electrochemical systems (fuel cells, electrolyzers, closed batteries): experimental and modelling
- thermochemical systems: methanation, power-to-gas processes, green fuels production: experimental and modeling
- experimental activity and modelling on SOFC generator and Balance of Plant;
- experimental activity and modelling on SOEC electrolyzers;
- experimental activity and modelling on PEMFC single cells and stacks;
- experimental activity and modelling of high pressure electrolysis fed by renewable sources;
- modelling, analysis and optimization of energy systems based on integration of RES and H<sub>2</sub>.

Coordinator of EU Project SOFCOM (FCH JU Call 2010), and DEMOSOFC (FCH2 JU Call 2014), REMOTE (FCH2 JU Call 2017).

Partner in EU projects: COMSOS, TEACHY, ICO2CHEM, DB-SOFC, BRISK II, GRINHY, ENEFIELD, ENFICA-FC, SELECT-CD, Explore Energy, Virtual Hub, MARS-EV.

Coordinator of National projects: PRIN 2009.

Partner of National projects: FISIR 2005, PRIN 2008, BioAlma

Coordinator of Regional projects: MULTISS, OZ-BOX, SOE/FC, BioSOFC

Partner of Regional projects: EOS and EBE, Micro CHP, Celco Yacht, PFHC, NanoSOFC, HySyPower, Mhyto, RES-COGEN, LAPIS, CARVOUR

Coordinator of STEPS Laboratory (Synergies of Thermochemical and Electrochemical Power Systems) of Politecnico di Torino: SOFC and SOEC single cells and short stacks; high pressure PEM electrolysis; power-to-chemical section (synthetic fuels).

Coordinator of the activities in the HySyLab laboratory (PEMFC and metal hydrides) and Centro Ricerche Edison (single SOFC tubular and planar).

Chair for Italy of ISO/TC 197 "Hydrogen Technologies".

## 3. Educational activities

Coordinator for POLITO of the EM MSc SELECT, and member of the Steering Committee.

Member of the Steering Committee of the EMJD SELECT+.

Teaching experience in the wide topic of Applied Thermodynamics (Thermodynamics and Heat Transfer, Second Course on Thermodynamics), and in the specific topic of Polygeneration (Polygeneration and Advanced Energy Systems).

At present, my courses are: (a) Polygeneration and Advanced Energy Systems; (b) Thermodynamics and Heat Transfer; (c) Environmental Pathways I, Environmental Pathways II, Advanced Renewable Energy Systems (in KTH-Stockholm and UPC-Barcelona)

#### 4. Some Publications in 2015-2016

1. Pozzo M., Lanzini A., Santarelli M, Enhanced biomass-to-liquid (BTL) conversion process through high temperature co-electrolysis in a solid oxide electrolysis cell (SOEC), *Fuel*, Vol. 145, pp. 39–49, 2015
2. Madi H., Lanzini A., Diethelm S., Papurello D., Van Herle J., Lualdi M., Gutzon Larsen J., Santarelli M., Solid oxide fuel cell anode degradation by the effect of siloxanes, *Journal of Power Sources*, Vol. 279, pp. 460-471, 2015
3. Rinaldi, G., McLarty, D., Brouwer, J., Lanzini, A., Santarelli, M., Study of CO<sub>2</sub> recovery in a carbonate fuel cell tri-generation plant, *Journal of Power Sources*, Vol. 284, pp. 16-26, 2015
4. Lorenzi, G., Lanzini, A., Santarelli, M., Digester gas upgrading to synthetic natural gas in solid oxide electrolysis cells, *Energy and Fuels*, Vol. 29, Issue 3, pp. 1641-1652, 2015
5. Ferrero, D., Lanzini, A., Leone, P., Santarelli, M., Reversible operation of solid oxide cells under electrolysis and fuel cell modes: Experimental study and model validation, *Chemical Engineering Journal*, Vol. 274, pp. 143-155, 2015
6. Chiodo, V., Galvagno, A., Lanzini, A., Papurello, D., Urbani, F., Santarelli, M., Freni, S., Biogas reforming process investigation for SOFC application, *Energy Conversion and Management*, Vol. 98, pp. 252-258, 2015
7. Papurello, D., Lanzini, A., Tognana, L., Silvestri, S., Santarelli, M., Waste to energy: Exploitation of biogas from organic waste in a 500 Wel solid oxide fuel cell (SOFC) stack, *Energy*, Vol. 85, pp. 145-158, 2015
8. Papurello D., Tognana L., Lanzini A., Smeacetto F., Santarelli M., Belcari I., Silvestri S., Biasioli F., Proton transfer reaction mass spectrometry technique for the monitoring of volatile sulfur compounds in a fuel cell quality clean-up system, *Fuel Processing Technology*, Vol. 130, pp. 136-146, 2015
9. Curletti F., Gandiglio M., Lanzini A., Santarelli M., Maréchal F., Large size biogas-fed Solid Oxide Fuel Cell power plants with carbon dioxide management: Technical and economic optimization, *Journal of Power Sources*, Vol. 294, pp. 669-690, 2015
10. Giglio E., Lanzini A., Santarelli M., Leone P., Synthetic natural gas via integrated high-temperature electrolysis and methanation: Part I-Energy performances, *Journal of Energy Storage*, Vol. 1, pp. 22-37, 2015
11. Giglio E., Lanzini A., Santarelli M., Leone P., Synthetic natural gas via integrated high-temperature electrolysis and methanation: Part II-Economic analysis, *Journal of Energy Storage*, Vol. 2, pp. 64-79, 2015
12. Papurello D., Lanzini A., Fiorilli S., Smeacetto F., Singh R., Santarelli M., Sulfur poisoning in Ni-anode solid oxide fuel cells (SOFCs): Deactivation in single cells and a stack, *Chemical Engineering Journal*, Vol. 283, pp. 1224-1233, 2016
13. Lanzini A., Guerra C., Leone P., Santarelli M., Smeacetto F., Fiorilli S., Gondolini A., Mercadelli E., Sanson A., Brandon N.P., Influence of the microstructure on the catalytic properties of SOFC anodes under dry reforming of methane, *Materials Letters*, Vol. 164, pp. 312-315, 2016
14. Cinti G., Discepoli G., Bidini G., Lanzini A., Santarelli M., Co-electrolysis of water and CO<sub>2</sub> in a solid oxide electrolyzer (SOE) stack, *International Journal of Energy Research*, Vol. 40, pp. 207-215, 2016
15. Papurello D., Tomasi L., Silvestri S., Belcari I., Santarelli M., Smeacetto F., Biasioli F., Biogas trace compound removal with ashes using proton transfer reaction time-of-flight mass spectrometry as innovative detection tool, *Fuel Processing Technology*, Vol. 145, pp. 62-75, 2016

#### Website reference

[http://www.swas.polito.it/rubrica/scheda\\_pers.asp?matricola=003570](http://www.swas.polito.it/rubrica/scheda_pers.asp?matricola=003570)