**Dr. Roberto Lanza**

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## EDUCATION & TRAINING

- M.Sc. in Industrial Chemistry, thesis title: *Realization and set up of an entrained flow reactor (EFR) and study on the influence of temperature and residence time on cellulose fast pyrolysis*. University of Padua, Italy, date of graduation: 2002-10-27.
- PhD in Chemical Engineering, PhD thesis title: *Experimental study on partial and total methane oxidation: preparation, characterization and activity tests over supported metallic catalysts.* University of Padua, date of graduation: 2007-03-26.

Further pedagogical and scientific education acquired at KTH, through the following courses:

- LH207V Doctoral supervision, 3.0 credits. Completed on 2012-12-12.
- LH201V Learning and Teaching 7.5 credits. Completed on 2012-04-25.
- LH203V Teaching and Learning in Subject Perspective. 4.5 credits. Completed on 2014-05-16.
- Attendance to a scientific development program, including 6 seminars. The program consisted of lectures and discussion with experienced research team leaders on topics such as research leadership, research-financed institutions, regulations and scientific development at different levels.

## PROFESSIONAL EXPERIENCE

**Researcher, University of Padua, Italy** **September 2002 – December 2003**

Collaboration with research duties and work coordination responsibilities of all the laboratory research activities, at Department of Chemical Engineering Principles and Practice (currently Department Industrial Engineering) at the University of Padua, Italy.

**Researcher, CNR – National Research Council, Padua, Italy** **July – December 2003**

Collaboration with ICIS (inorganic and surface chemistry department) for a study about diamond production, treatment and characterization techniques.

**Post-Doctoral student, KTH – Royal Institute of Technology** **July 2007 – May 2010**

- Research on cellulose flash pyrolysis, partial oxidation of methane (CPO), selective catalytic reduction of $NO_x$ (SCR), preferential CO oxidation (PROX).
- Studies funded by different scholarships. The main one was granted by the Foundation Blanceflor Boncompagni Ludovisi, née Bildt (Stockholm).

**Assistant Professor - Researcher, KTH – Royal Institute of Technology** **June 2010**

- Project leader of a project about reforming of tar derived from biomass gasification, involving 3 PhD projects (2 at KTH, Stockholm and 1 at Linnaeus University, Växjö).
- Project coordinator for the KTH node of the Swedish Gasification Centre (Svenskt Förgasningscentrum, SFC). SFC involves 9 universities and about 30 companies. The KTH node involves 3 Universities (KTH, LnU, MDH) and nearly 15 companies.
- Research on different environmental processes, mostly involving heterogeneous catalysis. (Tar reforming, volatile organic compounds abatement with advanced oxidation processes, partial oxidation of methane (CPO), selective catalytic reduction of $NO_x$ (SCR), preferential CO oxidation (PROX), direct synthesis of $H_2O_2$.
- Associated staff member of KTH Transport Lab
- Teacher and supervisor in several bachelor, master degree and PhD level courses.
- Supervisor or assistant supervisor of PhD students (4) and diploma workers (>15).

- Responsible for running external analysis in our catalyst characterization laboratory; responsible of the management of the centralized gas system of the department; evacuation manager; responsible for flammable goods.
- Reviewer for the following journals: Applied Catalysis A: General, Applied Catalysis B: Environmental, Catalysis Today, Fuel Processing Technology, Organic Reactions Catalysis Society, Journal of Hazardous Materials, International Journal of Hydrogen Energy, Fuel.

**TEACHING EXPERIENCE**

All the courses listed below are part of the educational program offered by the Department of Chemical Engineering and Technology of KTH.

**Bachelor degree level courses:**

- KA101X, Degree Project in Chemical Science and Engineering. 15.0 credits. Number of students: 50-70 in the whole course.
    - Starting from 2012, every year I supervised a variable number of students (3 to 6) working at a project that I had previously devised and modified or replaced during the years.
- KE1020, Reaction and Separation Engineering. 10.5 credits. Number of students: 40-60.
    - 2011 to 2014: in this course, I supervise 4 groups of students every year. They work at a rather complex assignment about a refinery process. The task is based on a real process run at Nynas, a highly specialized refinery outside Stockholm. My role is to help the students solving the problem, which is complex and complicated. I arrange 3 compulsory meetings with all the groups to discuss the task and explain the concepts involved in it. For this course I also organize a study visit to the refinery in Nynäshamn.

**Master degree level courses:**

- KE2050, Environmental Catalysis. 6.0 credits. 20-25 students.
    - 2011 to 2014: I am the course responsible and I take care of every administrative task connected to the course. I give lectures and organize guest lectures given by experts both from the academic and the industrial world. I am responsible for the course literature and for a project that the students have to work on, in order to complete the course. I also organize a study visit to Scania, where the students have the possibility to see some real applications of the principles and processes discussed in the course. During the years my commitment in the course has continuously increased and in the last edition of the course I dedicated 12 hours to frontal lectures and 6 hours to the student seminars, apart from all the preparation work.
    - Examination form: the students need to write a report about their project and also give an oral presentation, followed by discussion with their peers and with the teachers. Furthermore, there is a written exam at the end of the course.

- KE2190, Experimental Process Design. 6.0 credits. 10-16 students.
    - 2011-2014: I designed different laboratory projects for groups of students. I provided all the necessary materials and equipment and tested it in advance to make sure the whole testing rig would work properly. Other activities included are: description of the task and objectives, supervision of all the students in the laboratory (shared with the other supervisors), participation at the final seminar when the students present their project and results.

**PhD Courses:**

- 3C5619, Environmental Catalysis. 6.0 credits.
    - 2011 to 2014: this course is the same as the master level one described above, which is

also open to PhD students. Lectures and exams are the same, but the requirements for the assignments are different. PhD students need to submit a report related to their research topic, with higher standard of quality compared to the master degree students.

- Recently I detected the need for a PhD course about catalyst characterization. At our division, we have a well equipped laboratory, but it is not fully exploited because a lot of knowhow has not been passed on through different generations of students. For this reason, and since I have the required competence, I am setting up a course. In the course, the students will study the theory behind the different techniques and also perform practical analysis. At the end of the course they will have to pass a theory and practice exam to obtain the license to use the instruments.

Other teaching activities:

- During summer 2014, I supervised a student from the University of Illinois at Urbana-Champaign. KTH has established a program of exchange program and I was available to receive and supervise a student, for whom I set up a small experimental project.
- During the same period, I also set up another small project for a summer worker. Our school provides summer jobs to deserving students of the first and second year and I was asked by the head of the department to devise some activities for one student.
- in September 2013 I was invited to give a seminar about climate change and environmental awareness by the Sundbyberg IT-High School. The high school participates in an international program named "Future Urban Life" and invited speakers to give lectures and seminars to theirs and to international guest students.
- In May 2014, I participated to the "Mistra results day", where the project about VOCs abatement that I lead was introduced and explained to other research groups and also to invited companies and members of the press that attended the event. The event was advertised on the specialized newspaper "Ny teknik (New Technique)" and videos and presentations from the day are available on line (www.mistrainnovation.se).

**NETWORK OF CONTACTS**

- University of Padua (Italy):
  - Prof. Paolo Canu, Department of Chemical Engineering Principle and Practice. Collaboration for funding applications, research projects and student exchange. Through me, other colleagues became in contact with Prof. Canu and are now setting up new collaborations.
  - Prof. Antonella Glisenti, Department of Chemical Science. Discussion of experimental results, catalyst preparation techniques and design of experimental tests. Collaboration for catalyst characterization analyses.

- Åbo Akademi University (Finland):
  - Prof. Tapio Salmi, Department of Industrial Chemistry and Reaction Engineering.
  - Docent. Kalle Arve, Department of Industrial Chemistry and Reaction Engineering
  - Dr. Pierdomenico Biasi, Department of Industrial Chemistry and Reaction Engineering (currently Casale, Lugano, Switzerland).
  - Collaboration with both prof. Salmi and docent Arve for funding applications and to organize joint meetings between our departments. Collaboration with Prof. Salmi and Dr. Biasi in a project about direct synthesis of $H_2O_2$.

- Umeå University (Sweden):
  - Prof. J. P. Mikkola, Collaboration in a project about direct synthesis of H2O2.

- Jilin University (China):

- Prof. Min Haitao, Department of Automotive Engineering. Discussion of an exchange student programme between KTH and Jilin University.

- Cooperation with companies and universities:
  - Scandinavian Centriair AB (Sweden), Techniair Ltd (Great Britain), Lamb Weston Mejer VOF (Netherlands) and KTH, Phd Project about odor and VOC's removal.
  - QID nanotechnologies (Vicenza, Italy), University of Padua, University of Trieste, University of Bologna. Collaboration at a project for catalyst design and development.
  - Shanghai Jiao Tong University, collaboration within the Swedish Gasification Centre programme for biofuels production

**ANALYTICAL SKILLS**

**Advanced knowledge of the following techniques and related instruments:**

- Chemisorption
- Porosity analysis (BET, BJH methods)
- Temperature Programmed Reduction, Oxidation and Desorption
- X-ray Diffraction
- Atomic Absorption Spectroscopy
- Gas chromatography and mass spectrometry
- Infrared spectroscopy

**LANGUAGE SKILLS**

- Italian: mother tongue
- English: excellent (C2)
- Swedish: proficient (C1)
- Spanish: intermediate (B1)