



**POLITECNICO**  
MILANO 1863

DIPARTIMENTO DI CHIMICA,  
MATERIALI E INGEGNERIA CHIMICA  
GIULIO NATTA

# **ODOUR SCIENCE AND ENGINEERING**

CHIMICA INDUSTRIALE

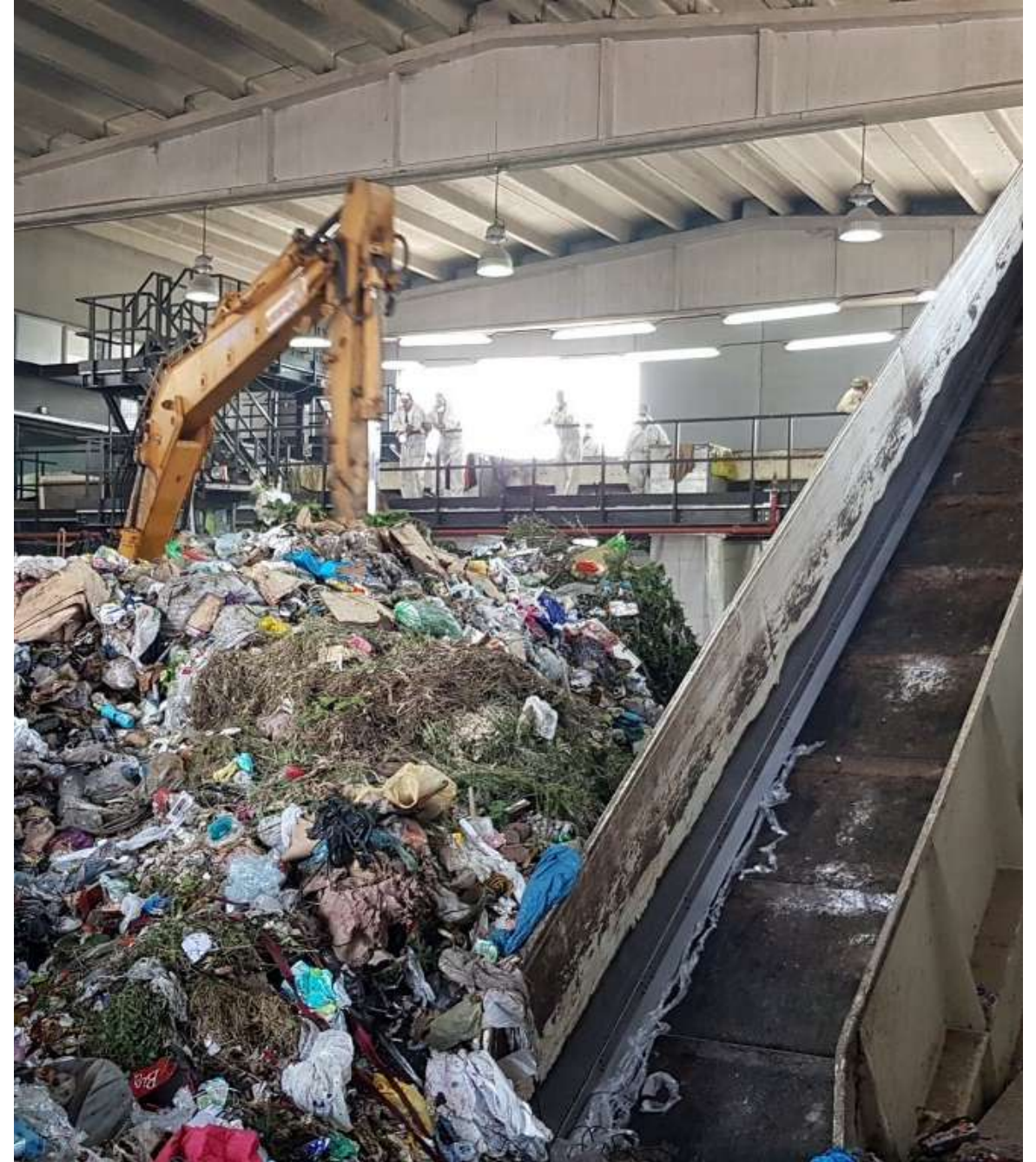
**Industrial Odour Pollution**

**Selena Sironi**

# INDUSTRIAL ODOUR CONTROL

Industrial odours are produced by a variety of facilities, including wastewater treatment and chemical processing, rubbish treatment and more.

- ▶ **Analitical techniques for odour measurement**
- ▶ **Implementation of sensorial techniques**
- ▶ **Method standardisation**





# MAIN TOPICS

## ► Odour assessment: improvement of techniques

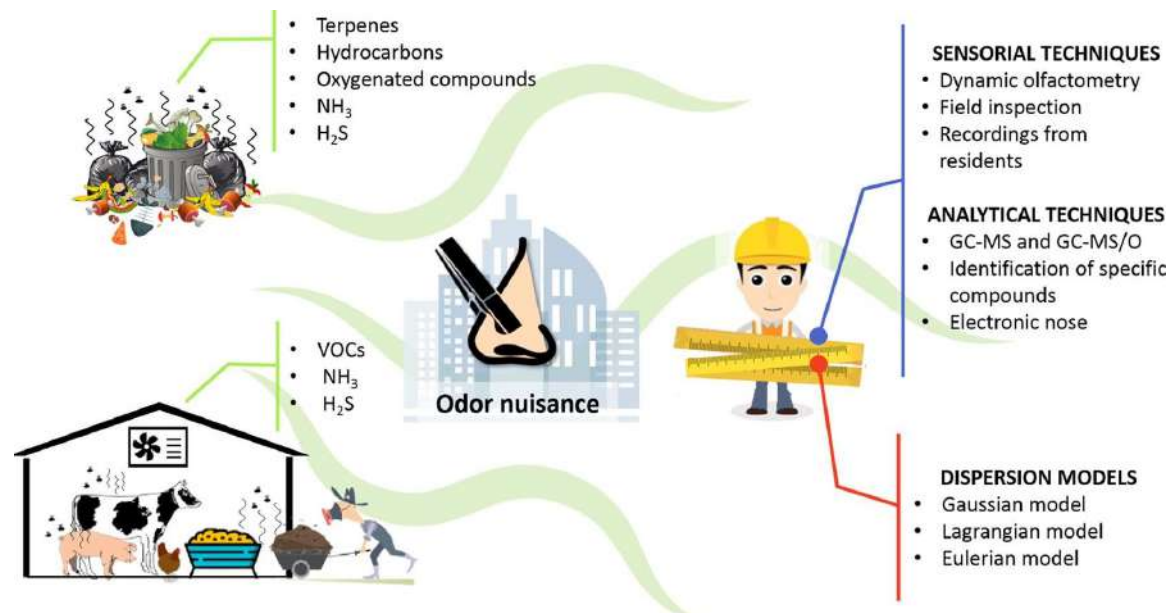
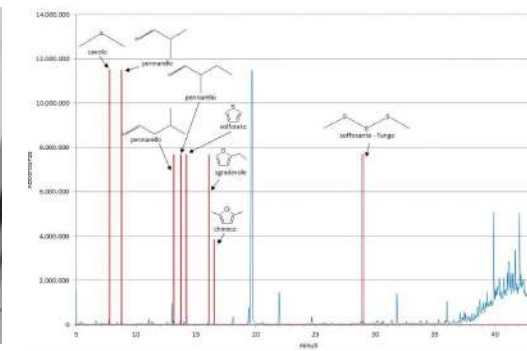
Chemical analysis,  
Dynamic Olfactometry,  
Electronic nose,  
Dispersion modelling,  
Social participation (citizen science).

## ► Odour emission factor

Landfill,  
M&B MSW,  
Composting,  
Rendering,  
WWTP

## ► Odour sampling and characterisation

Techniques and strategies for OER estimation from liquid and solid area passive sources  
Storage time influence



# PEOPLE

- ▶ 4 structured staff
- ▶ 10 young people staff (Post doc, PhD student, Research fellow)



**Selena Sironi**  
*Full professor*



**Emanuela Boiardi**  
*Lab Techn.*



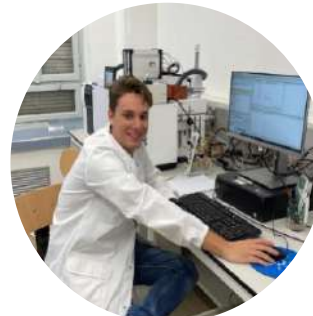
**Laura Capelli**  
*Associate professor*



**Marzio Invernizzi**  
*Assistant professor*



**Giacomo Scolieri**  
*Research fellow*



**Lorenzo Sartore**  
*Research fellow*



**Carmen Bax**  
*Post Doc*



**Elisa Polvara**  
*PhD Student*



**Francesca Tagliaferri**  
*PhD Student*



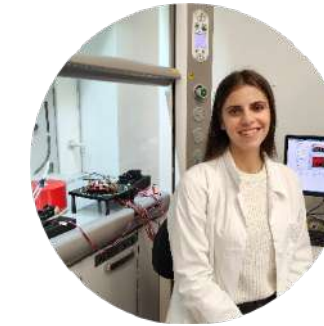
**Stefano Prudenza**  
*Assegnista*



**Beatrice Lotesoriere**  
*PhD Student*



**Alessandra Panzitta**  
*Research fellow*



**Giulia Uvezzi**  
*Research fellow*



**Bianca Di Diodoro**  
*PhD Student*





# CURRENT TOPICS

## Study of complex sources

Floating roof storage tanks, Liquid passive area sources (diluted solutions) , Solid passive area sources, Bubbling sources

## Inverse modelling

Field measurement, Reverse modelling

## Toxicological aspect linked with odour emission

For panel, workers and citizens

## Artificial olfaction for process control

Sensor sytems combined with specific artificial intelligence and machine learning algorithms



## BEYOND ENVIRONMENTAL ODOURS

DIAG-NOSE (in collaboration with Humanitas) an electronic nose for the early and non-invasive diagnosis of prostate cancer

- Patent EP19160856: Methods to assess the risk of being affected by prostate cancer (March 2019)
- Winner of 1° prize «Disruptive Innovation» at the S2P 2019 edition
- 200 k€ PoC investment by Poli360 venture capital investment fund (October 2021)





# DATA AND NUMBERS



Total amount: **3'158'612,50 €**

Local Principal Investigator

**207'625,00 €** to POLIMI.

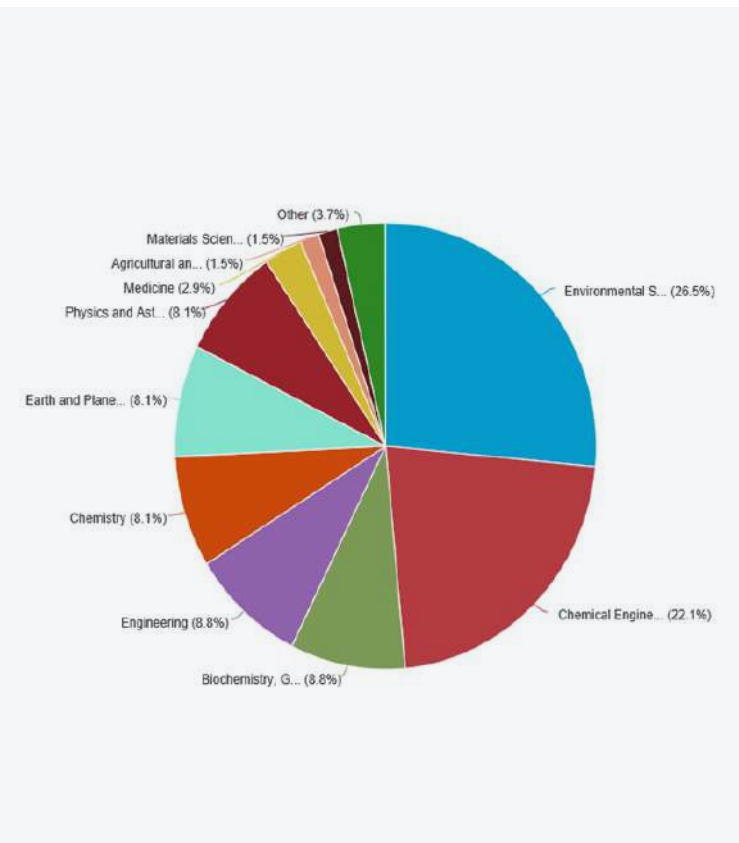
**200 ML €**

HORIZON 2018-2021



**6,5 MLN €**

INDUSTRIAL FOUNDING  
(2016-2021)



**50 Scopus paper**

PUBLICATION (2016-2021)



# NEW FRONTIERS

Fugitive emission

H<sub>2</sub>S

Geothermic fluid – natural emission





# NEW FRONTIERS

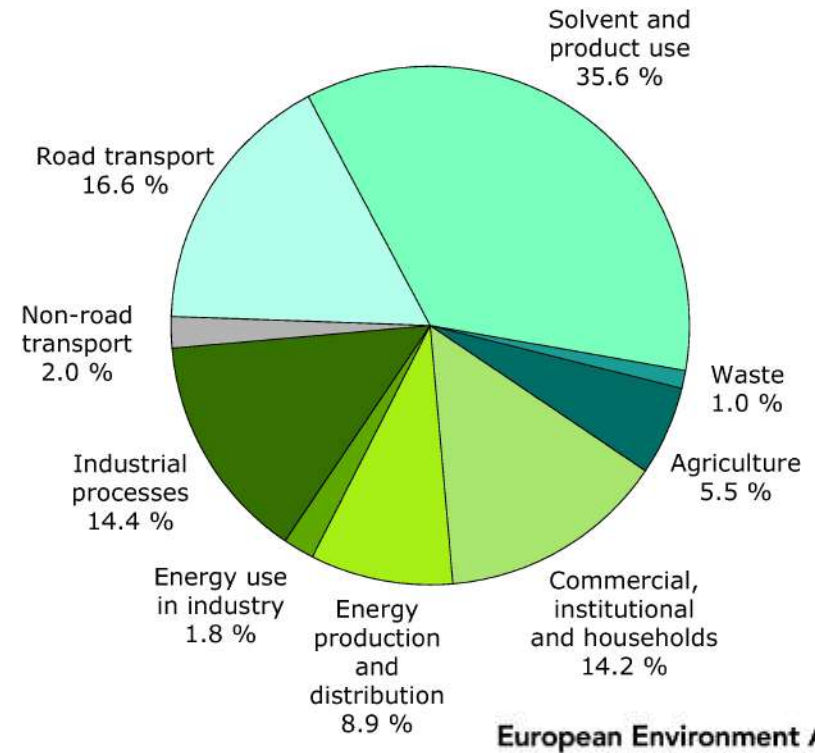
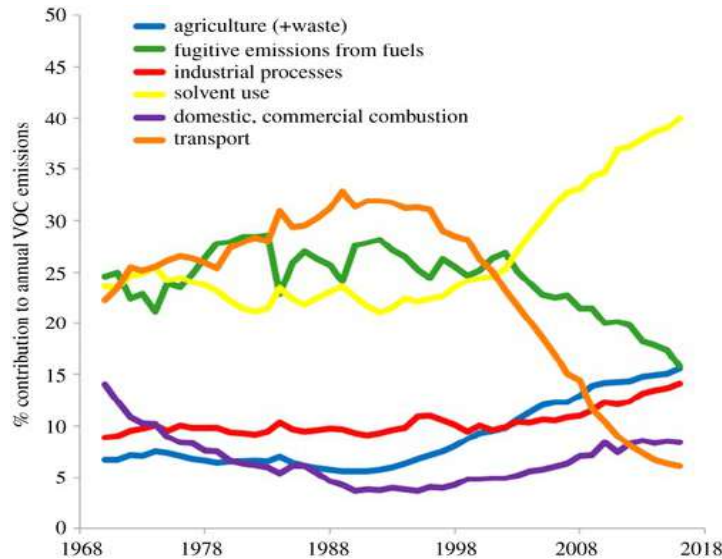
Renewable raw materials: Emission characterization

- ▶ **Anaerobic digester**
- ▶ **Woodchips biomass for energy production**
- ▶ **Biofuels**

# NEW FRONTIERS: NOT ONLY ODOUR

## FROM LABOLF TO AIR QUALITY LAB

- ▶ VOC
- ▶ PM
- ▶ GREEN HOUSE GASES



### Non-methane volatile organic compounds (NMVOC) emissions

“Non-methane volatile organic compounds (NMVOCs) are emitted into the atmosphere from a large number of sources including combustion activities, solvent use and production processes. NMVOCs contribute to the formation of ground level (tropospheric) ozone.

In addition, certain NMVOC species such as benzene and 1,3 butadiene are hazardous to human health. Quantifying the emissions of total NMVOCs provides an indicator of the emissions”





**GRAZIE**

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