



**European Network on New Sensing Technologies for Air
Pollution Control and Environmental Sustainability - *EuNetAir***

COST Action TD1105

Meeting at Duisburg, March 2013

Action Start date: 01/07/2012 - Action End date: 30/06/2016

Year: 2012-2013 (***Starting Action***)

ENVEVE

Marco Brini

SIG1

Switzerland



Scientific context and objectives in the Action

- **Background / Problem statement:** Despite the air pollutant increasing relevance and the well known risk posed to our health, nowadays the environmental monitoring is still mainly focused on expensive sensors and spot-sampling-based chemical analyses. There is a clear need for an inexpensive, continuous, distributed and real-time monitoring system.
- **Brief reminder of MoU objectives:** SIG1, SIG2, WG2

Current research activities of the Partner (1/2)

- EnvEve developed a unique wireless sensor network platform which has been applied (within others) to air quality monitoring



Current research activities of the Partner (1/2)

- Low cost toxic and explosive gas leakage



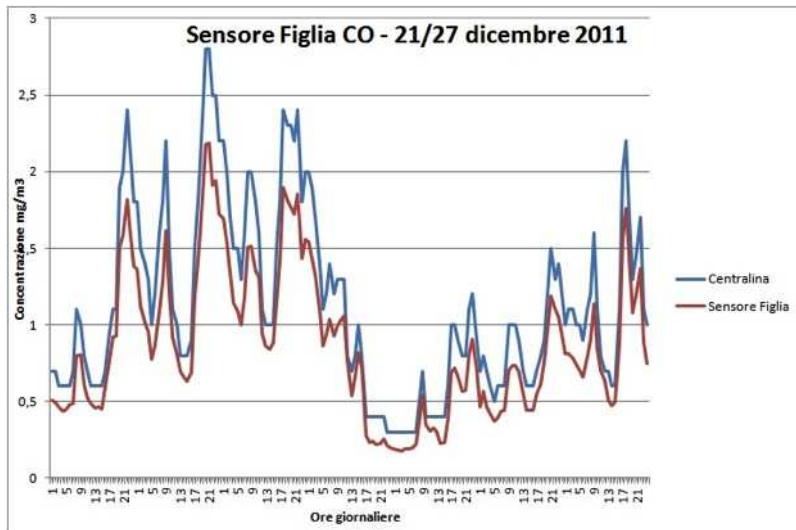
Current research activities of the Partner (1/2)

- Air pollution monitoring through distributed low cost, wireless sensors

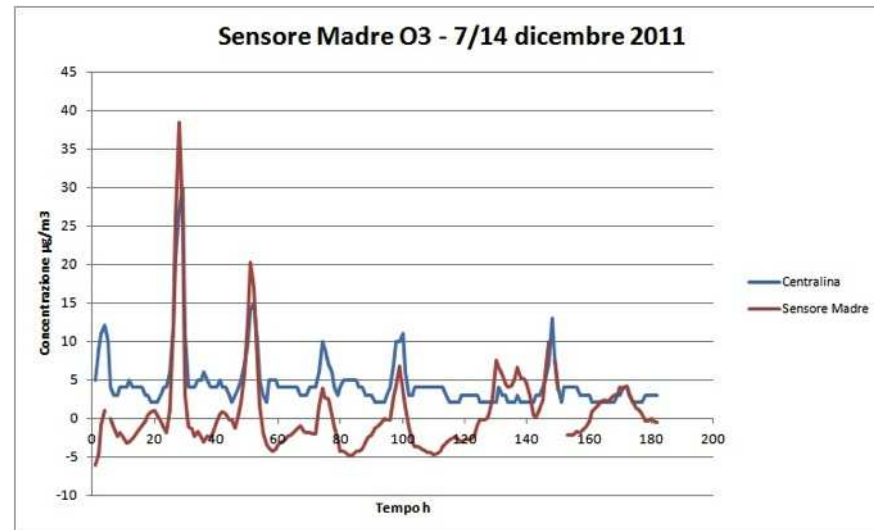


Current research activities of the Partner (1/2)

- Proving correlation with official monitoring sensors (ARPA)



Thick film wireless sensor

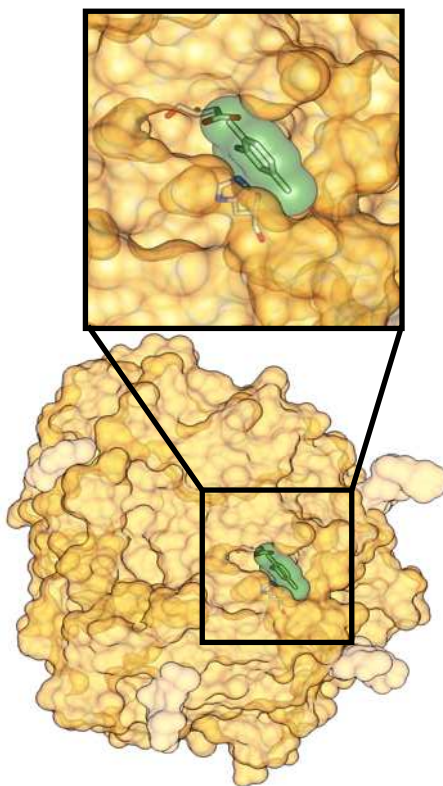
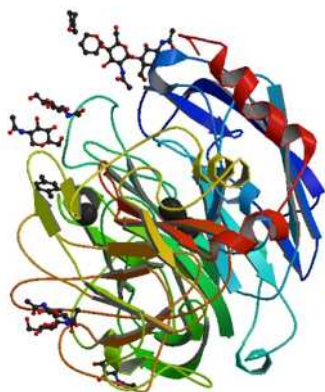


Electrochemical wireless sensor

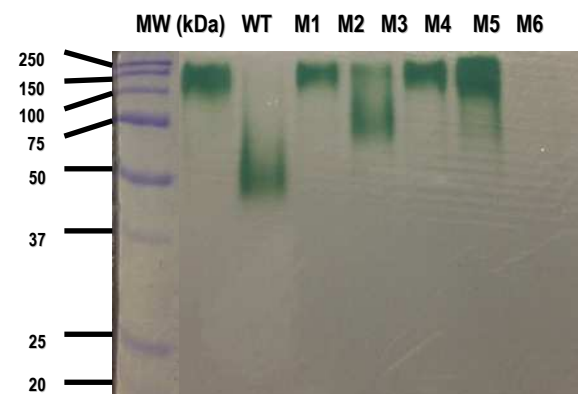
Current research activities of the Partner (1/2)

- POP detection through innovative biosensor based on enzyme

Oxidoreductase selected and engineered – up to 50 times more sensitive and selective to certain toxic molecules

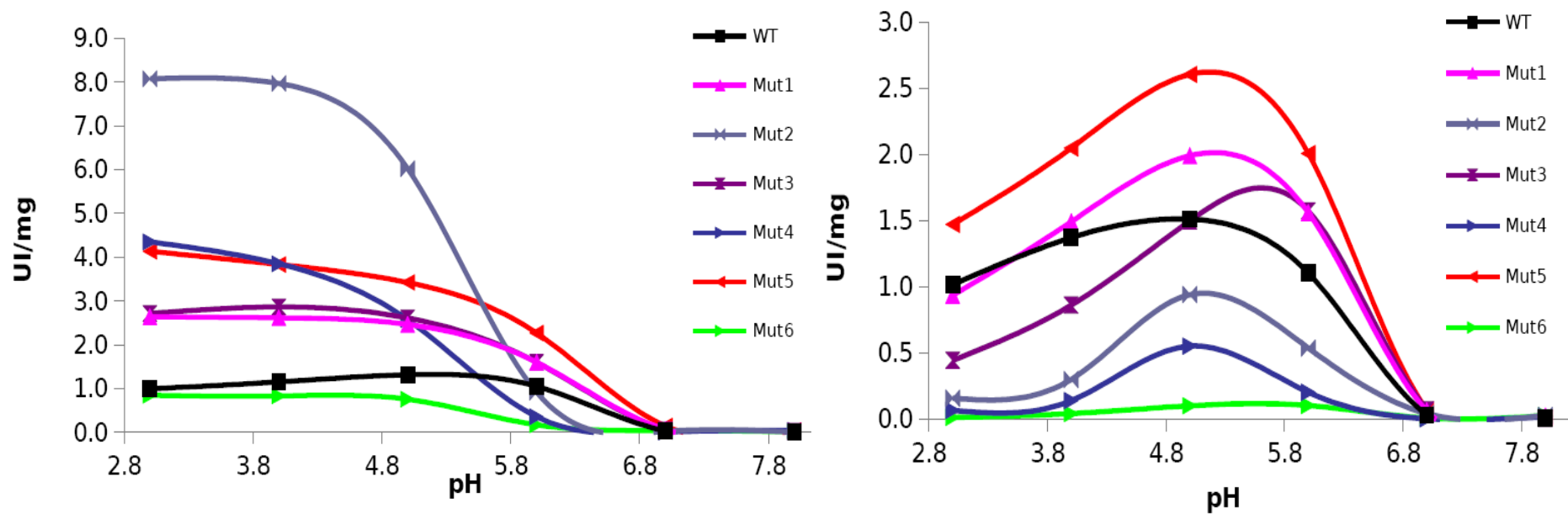


Tests proved it highly resistant even in denaturing conditions (Chromogenic substrate)



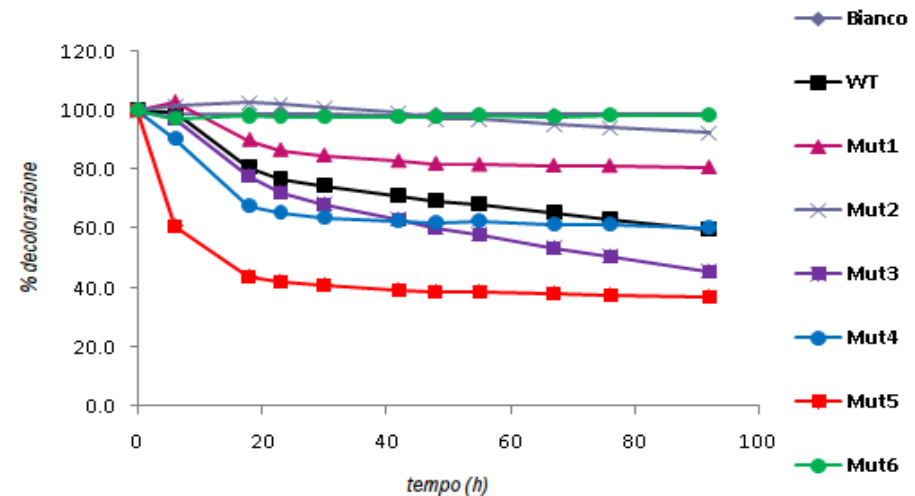
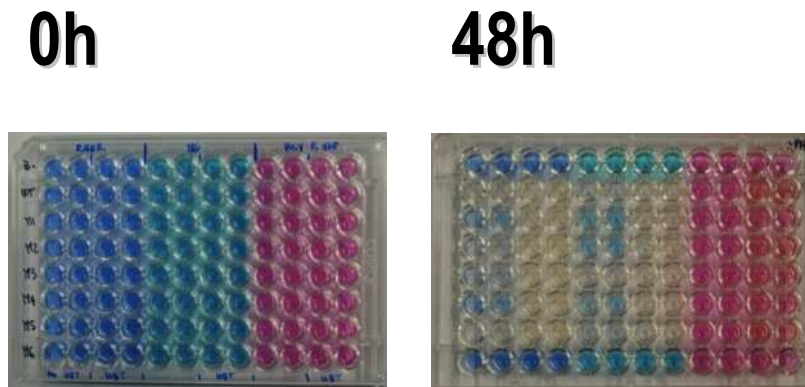
Current research activities of the Partner (1/2)

- Results of selectivity (phenolic vs. non phenolic)



Current research activities of the Partner (1/2)

- Responsivity tests:



Dye used: methyl green

(metabolization of methyl green is correlated to aromatic pollutants degradation)



Current research activities of the Partner (1/2)

- **Current research topics at the partner organization / Problem statement:**

Reliable, stable, low cost, low power sensor for POP and other air pollutants.

- **Brief list of ongoing research topics of the Partner:**

BIO(nano)SENSOR for reliable, inexpensive, distributed wireless monitoring solutions



Research Facilities available for the Partner (2/2)

- **Research Facilities:**
- Lab for Wireless Sensor Network (hardware and software)
- (others chemical and bio/nano lab facilities to EnvEve partners)

biosensor research team

Francesca Bosco [Biologist Researcher - Politecnico di Torino - IT]

Marco Brini [COST Action EuNetAir Expert (Inno env systems & Internet of Things) - CH]

Alessandro Chiadò [Biologist - Politecnico di Torino - IT]

Luca Marmo [Industrial Chemical Researcher - Politecnico di Torino - IT]

Luca Varani [Structural Biology Group Leader - IRB - CH]



Suggested **Priorities** for future research

The wireless sensor network EnvEve developed proved to be reliable and adequate for real-time, distributed air pollution monitoring.

Performances such as: 10 years battery life and kilometers of communication distances makes EnvEve WSN cheap to operate.

Now the challenge is in the area of sensors. Even though the electrochemical sensors proved very interesting in some parameter monitoring, the challenges of environmental monitoring are into the POP detection. **We think that developing new innovative sensors for POP (and other toxic molecules) monitoring is the real priority of air pollution monitoring.**