



*Translational
Medicine*

Respiratory

*Innovation: BioTechnologies
and Bioengineering*

“SeNSO” Sensore Nanostrutturato per Stress Ossidativo

PO FESR Sicilia 2014/2020, project n. 082651290364

Total Project Budget 2.933.950,76 euros
Budget for IRIB 394.273,98 euros



Research institutes :



Institute for Biomedical Research and Innovation, National Research Council (IRIB-CNR): Elisabetta Pace, Giuseppe Insalaco, Andreina Bruno, Giuseppina Chiappara, Claudia D'Anna, Caterina Di Sano, Serena Di Vincenzo, Maria Ferraro, Doriana Lo Piparo, Salvatore Romano.



RiMED Foundation: Chiara Cipollina, Marco Buscetta.



UNIPA - Department of Industrial and Digital Innovation Engineering: Rosalinda Inguanta, Giuseppe Aiello, Bernardo Patella, Francesca Mazzara, Fabrizio Ganci.

Industries:

- **DIPIETRO GROUP**
- **CERTY CEQ**
- **MICROSYSTEMS**
- **RULETECH**





Create an innovative laboratory tool to monitor the release of H_2O_2 in the culture medium in real time and without interfering with cell growth.

The device will be robust, reliable, small in size and therefore easily transportable and usable to measure the release of H_2O_2 in a laboratory environment even in very small volumes.

Methods

The integration of different disciplines such as **engineering**, **biology** and **medicine** with the support of the hi-tech industries promotes:

1. The development of innovative and advanced experimental models for the *in vitro* study of lung chronic inflammatory diseases (2D/3D single and multicellular cell cultures);

2. The development of an amperometric nano-sensor for the detection of hydrogen peroxide:

- first step, in *in vitro* systems;
- second step, in different biological fluids.



Published results demonstrated that the nano-sensor was able to measure hydrogen peroxide in human macrophages cultures.



Contents lists available at ScienceDirect

Sensors and Actuators: B. Chemical

journal homepage: www.elsevier.com/locate/snb



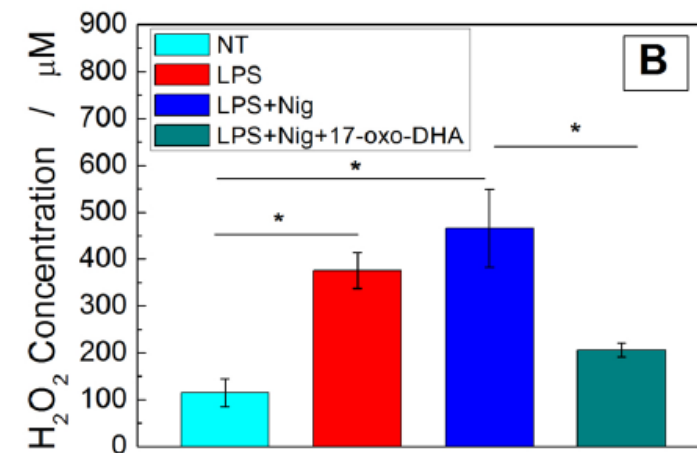
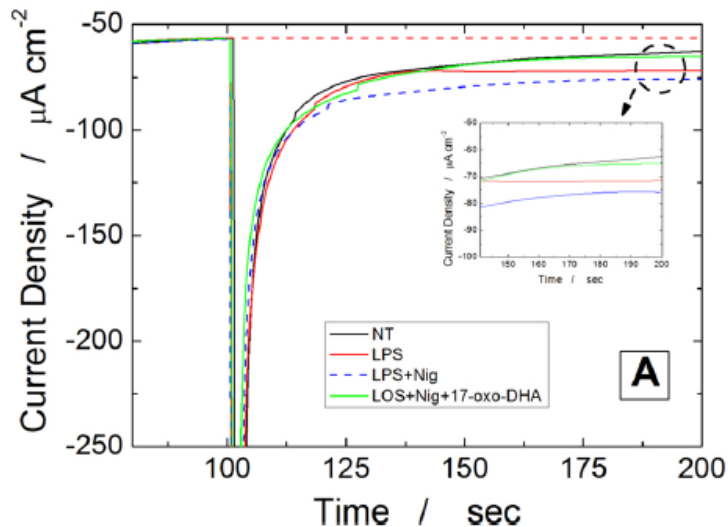
Electrochemical sensor based on rGO/Au nanoparticles for monitoring H_2O_2 released by human macrophages

B. Patella^{a,1}, M. Buscetta^{b,1}, S. Di Vincenzo^c, M. Ferraro^c, G. Aiello^a, C. Sunseri^a, E. Pace^c, R. Inguanta^{a,*}, C. Cipollina^{b,c}

^a Dipartimento di Ingegneria, Università degli Studi di Palermo, Italy

^b Fondazione Ri.MED, Palermo, Italy

^c Istituto per la Ricerca e l'Innovazione Biomedica (IRIB)-Consiglio Nazionale delle Ricerche, Palermo, Italy



WORK IN PROGRESS...

New unpublished results showed sensor sensitivity even in several more complex in vitro culture systems

Future perspectives

1. Optimization of the nano-sensor for the detection of **hydrogen peroxide directly on patients** [SENSOMAR (FISR-COVID project: FISR2020IP_03106)].
2. Application and validation of nano-sensor for the detection of **nitrate** and **dopamine** in different cell cultures, biological fluids and directly on patients.
3. Development and validation of nano-sensors for measuring **organic substances** (protein, DNA, RNA...).

All these expertises are mentioned in PROMO TT.

Contact:

Project leader: Elisabetta Pace (elisabetta.pace@irib.cnr.it)
serena.divincenzo@irib.cnr.it - www.irib.cnr.it

