

*THE GAME-CHANGING
SOLUTION FOR
PATHOGEN DETECTION*

ECLipse

ECL- based Infectious
Pathogen (bio)Sensor

OUR GOALS AND AMBITIONS

Coordinated by the University of Bologna, the new European project will develop portable devices with a level of sensitivity equal or higher than that of molecular PCR swabs, and with much faster results.

Eclipse aims to design and produce a nanobiotechnological platform for the detection of pathogens that is both economical, usable even by non-expert personnel and with a high level of sensitivity and reliability.

VISIT THE SITE TO STAY UPDATED

<https://eclipse-project.eu/>



The background of the slide features a large, circular, blue-tinted microscopic image of cells, possibly bacteria or protozoa, with some internal structures visible. On the left side, there is a vertical, out-of-focus image of a test tube or pipette tip. The overall color scheme is dominated by shades of blue and white.

The ultimate detection

Finding novel tools for pathogen detection for a new platform that will exploit innovative ultrasensitive protocols.

A platform for everybody

Making the detection reliable, fast, cheap, portable and simple to use even by a non-expert.

Against the next virus

Applying the platform to many other infectious agents, making it a “ready for the next pandemic” technology.

How we will work

Demonstrating the feasibility and adaptability of the ECLIPSE platform with three test cases: a virus, a bacterium and a protozoan.



A CHALLENGE FOR THE FUTURE

Infectious diseases are a threat to mankind since their appearance in human history. Despite the advances in science and technologies, such threats are still recurrent, as recently shown by the **COVID-19 pandemic** in 2020 – 2021, which has revealed the **urgent need for novel tools for pathogen detection** that would be at the same time **reliable, fast, cheap, portable and simple**.

The goal of **ECLIPSE** is to address this need, with a **new platform** exploiting **innovative ultrasensitive protocols for the detection of pathogens**. ECLIPSE builds on the combination of



interdisciplinary elements to facilitate the transfer to industry, i.e., (i) **ElectroChemiLuminescence (ECL)** as a very sensitive transduction mechanism for realizing simple, portable and cheap devices, (ii) **bio-, nano-, and supramolecular-based signal amplification structures** for increasing the sensitivity, and (iii) **two recognition strategies** to afford high affinity and selectivity, thus leading to high reliability: the **Phage-Sandwich technology** for the whole pathogen, and the **Surface Cooperative Hybridization technology** for microbial and viral nucleic acid.

We will demonstrate the **feasibility** and **adaptability** of the ECLIPSE platform with three test cases: a virus (SARS-CoV-2), a bacterium (*Pseudomonas aeruginosa*) and a protozoan parasite (*Leishmania infantum*). The platform is **designed to be applied to many other infectious agents**, making it a “ready for the next pandemic” technology. ECLIPSE is expected to become a **game-changer in European countries**, where it could be a cornerstone for **fast testing** and **reliable tracking of infections**, and in developing countries that will benefit from a **cheap and simple approach** to detect the many infectious diseases that affect millions of people every year. The project results will be validated and demonstrated at partners’ premisses.

TECHNOLOGY

Eclipse's success is based on the development of different technological elements; their synergistic combination, in fact, can allow us reaching our ambitious goal. In particular, our work is structured in the following keypoints:



Improve bio- and nano-structures for signal amplification in luminescence-based techniques; with these elements we intend to decrease even more the limits of detection of analytical techniques that are already used in clinical tests, increasing the number of reporters per analyte and thus their analytical performances;



Design new biotechnological approaches for the recognition of the desired analytical target endowed with high affinity and selectivity, in this way decreasing the occurrence of false positive and negative results;



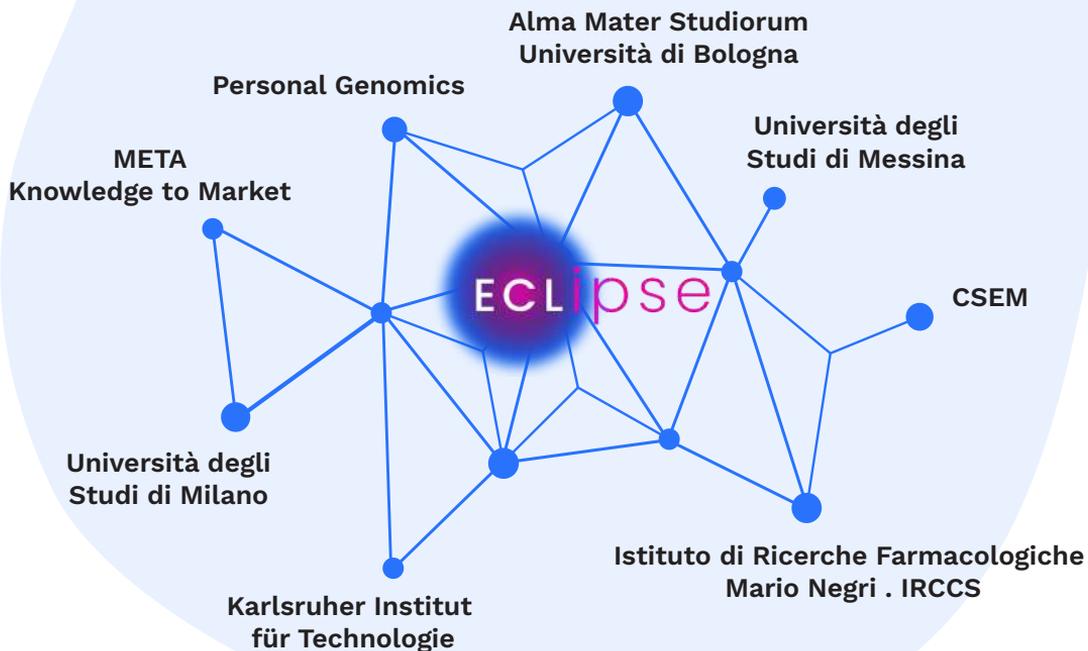
Push the electrochemiluminescence detection technologies to unprecedented sensitivities, through a detailed study of all the mechanisms leading to the generation of light, including those involving signal amplification;



Fabricate suitable prototypes of the analytical platform in order to make the system portable, fast and leading to very cheap tests.

Importantly, each one of these elements can also offer, by itself, highly advanced solutions in many other analyses of clinical relevance, making the advancement of Eclipse a source of innovations for clinical analysis.

RESEARCH TEAM



development

microfluidic

ECLipse

real samples

portable

ultrasensitive platform

phages

ECL

nucleic acid

device

signal amplification

electrodes functionalization

pathogens

accurate

nanostructure

fast

electrochemiluminescence

ECLIPSE

**ECL- based Infectious
Pathogen (bio)Sensor**

Contacts

ECLIPSE project coordinator

Alma Mater Studiorum - Università di Bologna

Luca Prodi

luca.prodi@unibo.it

ECLIPSE project manager

Alma Mater Studiorum - Università di Bologna

Maria Grazia Attianese

mg.attianese@unibo.it

Partners



Funded by the European Union

Eclipse project has received funding from the European Union's Horizon Europe EIC Pathfinder Open programme under Grant Agreement N. 101046787.

Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EIC- EISMEA. Neither the European Union nor the granting authority can be held responsible for them.