Development of a high sensitive and specific nanobiosensor based on surface enhanced vibrational spectroscopy dedicated to the in vitro proteins detection and disease diagnosis

Fact Sheet

Project Information

NANOANTENNA

Grant agreement ID: 241818

Project website

Project closed

Start date
1 October 2009

End date
31 March 2013

Funded under
Specific Programme "Cooperation": Health

Total cost
€ 5 920 214,52

EU contribution
€ 3 999 925,80

Coordinated by
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS
France

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Objective

The main goal of our proposal is to develop a novel optical nanobiosensor based on extraordinary vibrational signal enhancement of the proteins to be detected. To reach vibrational signal enhancement, we will exploit the optical properties of specially designed metallic nanoparticles which should act as nanoantenna and the associated field enhancement to obtain a direct detection of proteins bound to the nanoparticle. Thus, our sensor will reach high sensitivity provided by the recently established large enhancement of vibration signals due to the resonant excitation of the nanoantenna device used as substrates. The aim is to detect only a few proteins with concentration much lower than 1pM and finally to reach detection threshold such as femtomole or lower. High molecular selectivity will be reached with the functionalisation of the nanoantenna. Such functionalisation will selectively favour the immobilisation of the protein to be detected at the vicinity of the nanoparticle surface, providing the best enhancement and then the detection of the targeted protein. Our nanobiosensor will include two main components: the nanoantenna device which corresponds to our sensor transducer and the functionalisation which corresponds to its bioreceptor. And then, each functionalised nanoantenna device used as vibrational signal enhanced system is an individual and specific nanosensor of proteins. As a consequence, our nanobiosensor integrated in a vibrational spectroscope will allow the detection and the analysis of the enhanced vibrational signal from the targeted proteins and thus corresponds to our diagnosis instrument.

Our nanobiosensor will be validated on the detection of proteins on body fluids.These proteins have been chosen since they have been identified as specific biomarkers of common pathologies. This validation will be applied it to improve their detection (better sensitivity, decrease of the detection threshold) and open the way to the early diagnosis.

Fields of science (EuroSciVoc)

natural sciences > biological sciences > biochemistry > biomolecules > **proteins**

engineering and technology > electrical engineering, electronic engineering, information engineering > electronic engineering > **sensors**

medical and health sciences > basic medicine > **pathology**

engineering and technology > nanotechnology > **nano-materials**

natural sciences > physical sciences > optics > **spectroscopy**

Keywords

Nanobiosensor | diagnosis | nanoantenna | optical properties | protein detection | proteins | vibrational fingerprint

Programme(s)

FP7-HEALTH - Specific Programme "Cooperation": Health

Topic(s)

HEALTH-2009-1.2-1 - Development of tools for sensitive and specific in vitro detection of proteins and their interactions for diagnostic, prognostic and monitoring purposes

Call for proposal

FP7-HEALTH-2009-single-stage
See other projects for this call

Funding Scheme

CP-FP - Small or medium-scale focused research project

Coordinator

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

EU contribution

€ 599 491,00

Total cost

No data

Address

RUE MICHEL ANGE 3
75794 Paris
France

Region

Ile-de-France > Ile-de-France > Hauts-de-Seine

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Participants (11)

AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS

Spain

EU contribution

€ 279 891,50

Address

CALLE SERRANO 117
28006 Madrid

Region

Comunidad de Madrid > Comunidad de Madrid > Madrid

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

INSTITUT NATIONAL DE LA SANTE ET DE LA RECHERCHE MEDICALE

France

EU contribution

€ 277 718,30

Address

RUE DE TOLBIAC 101
75654 Paris

Region

Ile-de-France > Ile-de-France > Paris

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

RUPRECHT-KARLS-UNIVERSITAET HEIDELBERG

Germany

EU contribution

€ 319 946,00

Address

SEMINARSTRASSE 2
69117 Heidelberg

Region

Baden-Württemberg > Karlsruhe > Heidelberg, Stadtkreis

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

CONSIGLIO NAZIONALE DELLE RICERCHE

Italy

EU contribution

€ 282 165,00

Address

PIAZZALE ALDO MORO 7
00185 Roma

Region

Centro (IT) > Lazio > Roma

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

BEN-GURION UNIVERSITY OF THE NEGEV

Israel

EU contribution

€ 319 897,00

Address

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84105 Beer Sheva

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

ASOCIACION CENTRO DE INVESTIGACION COOPERATIVA EN NANOCIENCIAS CIC NANOGUNE

Spain

EU contribution

€ 270 036,00

Address

TOLOSA HIRIBIDEA 76
20018 San Sebastian

Region

Noreste > País Vasco > Gipuzkoa

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

FONDAZIONE ISTITUTO ITALIANO DI TECNOLOGIA

Italy

EU contribution

€ 340 131,00

Address

VIA MOREGO 30
16163 Genova

Region

Nord-Ovest > Liguria > Genova

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

HORIBA FRANCE SAS

France

EU contribution

€ 367 092,00

Address

14 BOULEVARD THOMAS GOBERT PASSAGE JOBIN YVON CS 4
91120 Palaiseau

Region

Ile-de-France > Ile-de-France > Essonne

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

ASOCIACION CENTRO DE INVESTIGACION COOPERATIVA EN BIOMATERIALES- CIC biomaGUNE

Spain

EU contribution

€ 269 649,00

Address

PASEO MIRAMON 182, PARQUE TECNOLOGICO DE SAN SEBASTIAN EDIFICIO EMPRESARIAL C
20009 San Sebastian

Region

Noreste > País Vasco > Gipuzkoa

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

UNIVERSITE DE TECHNOLOGIE DE TROYES

France

EU contribution

€ 273 950,00

Address

RUE MARIE CURIE 12
10004 Troyes

Region

Grand Est > Champagne-Ardenne > Aube

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

TECHNOCLONE HERSTELLUNG DIAGNOSTIKAUND ARZNEIMITTELN GMBH

Austria

EU contribution

€ 399 959,00

Address

BRUNNERSTRASSE 59/5
1230 WIEN

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

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