Project nr.: 026602
Project acronym: IMANE
Project title: Implantable Multi-contact Active Nerve Electrode

Instrument: Specific Targeted Research Project
Thematic priority: Information Society Technologies

D0.3.2: Technological Implementation Plan
Month 1-Month 36

Due date of deliverable: 30 November 2009
Date of actual submission: 31 December 2009

Start date of project: 1 January 2006 Duration : 36 months

Organisation name of lead contractor for this deliverable:

NeuroTECH SA

Project co-funded by the European Commission within the Sixth Framework Program (2002-2006)		
Dissemination Level		
P	Public	
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the commission Services)	X

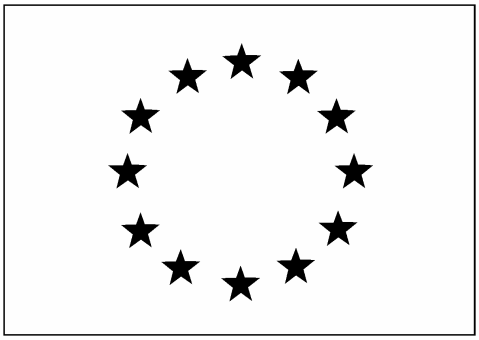
TECHNOLOGICAL IMPLEMENTATION PLAN

A Framework for the further development, dissemination and use of the results of EC RTD Projects (including also thematic networks and concerted actions)

IMANE

Implantable Multicontact Active Nerve Electrode

Contract number: IST-4-026602-STP



Final version before final term

Document Control Sheet

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Work area: WP 0
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Other author(s):

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Version history:

Version	Date	Main author	Summary of changes
0.1	30/05/2008	Véronique Burguet	Initial version
0.2	04/12/2008	IMANE partners	New version with part 2

Approval:

	Name	Date
Prepared	Véronique Burguet	27.05.08
Reviewed	Michel Troosters	29.05.08
Authorized	Jean Delbeke	16.06.08

Technology Implementation Plan

Part 1 Overview and description of your project and its results

EC PROGRAMME:	**Information Society Technologies (IST)**
PROJECT TITLE & ACRONYM:	**Implantable Multicontact Active Nerve Electrode - IMANE**
CONTRACT NUMBER:	**IST-4-026602-STP**
PARTNERS NAMES:	**Université Catholique de Louvain : GREN, PCPM, ISTO (B);** **Universiteit Gent (UGent) (B);** **University College London: BME, EEL (UK);** **University of Bath (Ubath) (UK);** **Centre National de recherche scientifique : CERLA (F);** **Applied Microengineering Limited (UK);** **NeuroTECH SA (B);** **MATRA Electronique (F)**

1.1 Executive summary

1.1.1 Original research objectives

The failing organ substitution usually requires an interface between the nervous system and an electronic device. It is necessary to have a good understanding of the nervous system in order to develop an efficient means of communication with it and then to make the implant independent.

The main objectives of the IMANE project are to acquire generic know-how in the field of the implanted medical devices and to get new key technologies to be exploited in as many Functional Electrical Stimulation (FES) applications as possible.

These objectives are implemented in the development of a bi-directional telemetry-controlled implanted micro-system matching responses to ongoing activity as well as automatically avoiding stimulation damage. In this perspective, an implanted active neural cuff electrode, which matches stimulation and recording functions, was to be manufactured. New surface treatment and metallisation process of medical grade silicone rubber must be designed on the one hand to get a miniature electrode with a high contact density and on the other hand to establish an industrialized fabrication procedure. Two silicone rubber surface treatments were considered: the first one activates rubber surface through gas plasma, and the second one uses YAG laser. These methods must be compared with some benchmarks through the project. The cuff-electrode processing tries out the “on-wafer” fabrication, which is apt to be integrated in an industrialized process and facilitates the electronics placement by directly incorporating miniaturized feedthroughs for the connections. The active cuff-electrode holds embedded electronics, including a low noise and low power amplifier ASIC (i.e. Application Specific Integrated Circuit), which derives a diameter selective neural signal from a stimulation electrode. It is also interesting to find out a way to replace or eliminate the blocking capacitors, which prevent direct current flowing through the electrode or under fault conditions. The absence of these capacitors significantly reduces congestion space on the electrode. A transcutaneous power and data line has to be appropriately designed to manage a bi-directional traffic of data (physiological information out, device control in) and a recharging system.

Next to the creation of an implant, the IMANE project wants to use its recording method to monitor the nerve status and to collect information by experimentations in vivo. The study aims to determine a safe stimulation regimen by defining maximal allowable stimulus parameters and physiologic changes correlated with changes in observed factors (tissue impedance changes, nerve DC potential, etc.). This information could be used to fulfill the requirements for an isomorphic and predictive model of absence epilepsy, to increase long-term efficiency of VNS, to provide some additional information about the VNS mechanisms and to define the target fibers for VNS.

1.1.2 Expected deliverables

Deliverable name	Lead participant	Delivery date (in project month)
WP 0 **Project management**		
D0.1.1a: Periodic activity report	GREN	8, 19, 31
D0.1.1b: Periodic management report (financial data)	GREN	8, 19, 31
D0.1.1c: Periodic report on the distribution of the Community contribution between contractors	GREN	13, 25, 36
D0.1.2a: Project description for public use	GREN	4
D0.1.2b: Interim Science and Society questionnaire	GREN	Cancelled
D0.1.2c: Interim questionnaire on Workforce statistics	GREN	Cancelled
D0.1.2d: Interim Socio-economic questionnaire	GREN	Cancelled
D0.1.3: First yearly report	GREN	13
D0.1.4: Second yearly report	GREN	25
D0.1.5: Final yearly report	GREN	36
D0.2: IPR (Intellectual Property Rights), certifying documents	AML	36
D0.3.1: Preliminary exploitation plan	NEUROTECH	24
D0.3.2: TIP	NEUROTECH	36
D0.4: Report on raising public participation and awareness	MEL	36
D0.5: Final plan for using and disseminating knowledge	AML, NEUROTECH and MEL	36
WP 1 **Silicone metallisation**		
D1.2.1: 10 metallised sheets	PCPM	14
D1.2.2: 30 metallised sheets	PCPM	19
D1.5: 10 metallised sheets	PCPM	22
D1.6: 20 activated rubber sheets	CERLA	14
D1.7: 10 metallised rubber sheets	CERLA	15
D1.8: Final report on metallisation	CERLA	36
WP 2 **Electrode contacts**		
D2.2: 20 coated samples	CERLA	28
D2.4.1: report on ethical evaluation	GREN	15
D2.4.2 report on functional electrode contact characterization	GREN	30
D2.4.3 report on tissue reaction	ISTO	30
D2.5: 5 coated samples	CERLA	28
D2.6: Global report on electrode contacts	CERLA	36
WP 3 **Neural amplifiers**		
D3.3: 3 samples	BATH	14
D3.4.1: report on ethical evaluation	GREN	15
D3.4.2: report on in vivo nerve recording	GREN	26
D3.6: 3 samples	BATH	25
D3.7: Global report on amplifiers	BATH	36
D3.8: 5 samples	BATH	25

WP 4 **Neural stimulation**

D4.3.1: Delivery of 3 samples	EEL	31
D4.3.2: Delivery of 2 samples	EEL	31
D4.5: Report on the complete stimulation + recording system (the NewDemoCuff ASIC) and the in vitro testing	EEL	36
D4.8.2: Report on in vivo testing of stimulator	GREN	36

WP 5 **On wafer fabrication**

D5.1.4: Wafers / part wafers from Ubath (for electroplating trials)		14
D5.1.5: Report on qualified 'on wafer' method	AML	25
D5.2: Development cuffs made available to BME for physical testing Batch 1.3 –		18, 23 and 26
D5.3: Samples for T6.6 (15 Continuity Test Cuffs and 7 Active Cuffs)	AML	32 (continuity) and 36 (active)
D5.3.1: Supply of wafers	BATH	24

WP 6 **Electrode connection**

D6.2: 30 cables termination assemblies	BME	27
D6.3: 8 samples of 'continuity cuffs'	BME	33
D6.6.1: 8 Continuity Test Cuffs to be mounted on cables and encapsulated, ready for testing	BME	33
D6.6.2: Deliver 5 Active Cuffs on cables to NEUROTECH	BME	34
D6.8: Report on cable joining, silicone encapsulation, Development and Continuity Tests	BME	36

WP 7 **Epilepsy model**

D7.5: Report on epilepsy model	UGENT	30
D7.6: Report on optimal VNS requirements	UGENT	36

WP 8 **Global system**

D8.3.2: Abstract of Industrial Report	MEL	36
D8.4: 2 test samples + 3 implantable samples	CERLA	32
D8.5.2: Report on T8.5.2	GREN	36
D8.6: 3 demonstrators made available to each of the industrial partners		

1.1.3 Project's actual outcome

The main goals of the project have been met:

- a new metallization process by laser has been developed;
- ASIC for the recording of nerve signals with conduction velocity selectivity and a bi-directional digital communication port has been fabricated;
- ASICs with novel stimulator output stage circuits, which minimize the physical size of the stimulation coupling (or blocking) capacitor, using the new high-frequency current-switching (HFCS) technique has been fabricated;
- knowledge of the physiologic consequences for nerve tissue has been improved;
- a wafer-scale commercially viable fabrication process for making active cuffs has been developed;
- animal models of epilepsy has been achieved;
- a new system of communication has been applied;
- a cheaper encapsulation material for short term implantation has been tested;
- an industrial fabrication process has been developed;

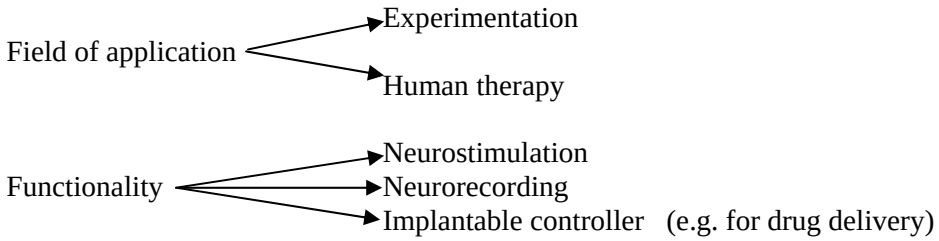
- significant publications including PhDs will result from this project;
- a patent on system interconnection is in the registration process.

Several new technological developments have turned out to be more difficult to complete than initially anticipated; among these the connection system on the silicone cuff should be mentioned.

1.1.4 Broad dissemination and use intentions for the expected outputs

Product identification / Applications

The product or the sub-product will be identified in accordance with the potential applications. Classification of the products can be done following two main parameters: according to the application field and to the functionality:



Human therapy applications require generally long term implantation. On the contrary, animal experimentation requires short term devices. In this second case, the device cost becomes a critical element. Short or medium term implantations for human applications are relatively rare, some examples are temporary and local drug delivery, e.g. in case of cancer treatment and nerve or bone regeneration.

The IMANE system is subdivided into two main elements, the Electrode and the Monitoring unit. Both have electronic encapsulated into respectively glass and polymer (i.e. PEEK) housing. Glass encapsulation can be used for long term implantation (up to 20 years), while polymers due to their unavoidable permeability (even if PEEK is considered as relatively watertight or hermetic) must be considered as medium term (1 year) implants. An advantage of polymer encapsulation lies in a lower production cost in comparison with the typical Titanium encapsulation. The glass encapsulation is brittle but this is not really an issue for micro-encapsulations.

Similary, the IMANE connector is designed for both long and short term use. The two connector categories are characterised by their respective feedthrough quality. The long term feedthroughs are made out of Ti-ceramic-Pt and are very expensive. Whereas the short term feedthroughs are made of 316L-PEEK and are relatively cheap.

Below are summarized the key IMANE technologies and their application examples:

IMANE Technologies	Target applications
Optimized silicone rubber metallization method	• Cuff electrodes obtained through silicone metallization could be placed around any nerve like the vagus nerve or other peripheral nerves. They present the advantages of being more flexible than electrodes with stuck metal contacts, have more possibilities for complex layouts and can be fabricated through an industrial process. • Flat electrode fabrication with metallised silicone: could be inserted on the brain surface and operate as electrocorticography electrodes. • Sensors could be fabricated on the same principle.
PEEK encapsulation	The PEEK encapsulation method could be used for short term human implantation (e.g. for drug delivery); this polymer encapsulation presents the advantage to be transparent to magnetic radiation, which allows putting an antenna inside the housing.
Connecting parts	The connection is a weak link in the implementation of an implant. It must be watertight and resistant to mechanical stresses and pressure. • The IMANE connector is easy to insert by mechanical guidance and polarization, low insertion force, automatic locking system (no screws) and long term reliability of the electrical contacts. • The cables are designed to have relatively small electrical resistance and to withstand flexural stresses.

Integrated blocking capacitors	This technology allows us to eliminate the usual decoupling discrete capacitors, thus saving space but also reducing a wasted voltage drop outside the target. This technique could very much benefit multichannel applications such as cochlear implants where the number of electrode contacts can rise up to e.g. 22 (model Nucleus Freedom™ from Cochlear™).
Multi-polar/multi-stage low noise amplifier	This type of amplifier can improve the neural activity measurement. Such measurements are attempted more and more to obtain signal from which to control rehabilitation stimulators or effectors such as an artificial limb). In the same kind of applications, recording the induced activity can provide a useful control feedback for stimulation.
Active electrode	An active electrode with multiplexing features is attractive for applications requiring a high number of electrical contacts, for example for visual prosthesis. The short distance between the sensing electrode contact and the amplifier input helps to reduce noise when noise is an issue in applications such as the neural activity measurement.
Cuff "on-wafer" fabrication process	The cuff-on-a-wafer process is an innovative industry compatible fabrication method, which can leads to increased productivity and reduced fabrication time.
Glass micro-encapsulation	Micro-electronic encapsulation is a multi-application technology with broad prospect of applications in fields such as medicine and space research.

In conclusion, the IMANE project is covering multi-purpose technologies for the fabrication of implantable neurostimulators or neurosensors.

Market / Sales / Price

1.5 billion people around the world currently suffer from neurological diseases or psychiatric illnesses (cfr. *The Neurotechnology Industry 2005*, NeuroInsights, LLC) and the worldwide economic impact of this problem has reached more than $2 trillion per year. With the emergence of new neurostimulation technologies, a lot of neurological diseases as chronic pain, spinal cord injuries, Parkinson's disease, refractory epilepsy, depression, cerebral vascular accidents (stroke), muscles plasticity, urge incontinence, sleep disorders, tinnitus, vestibular disorders, migraine and Alzheimer's disease have become possible application fields. In comparison with medicinal treatments, electrical stimulation induces less side effects because the target is more selectively affected than with a chemical that is bound to diffuse throughout the body.

Many laboratories are now looking for such devices as well. Experimental research in animals is an attractive market because:
- in general, relatively large numbers are needed for statistical significance;
- the regulatory authorities are expectedly less restrictive than for human applications;
- for a new product, the risks are much lower.
- experimental findings can be exploited to strengthen the quality of the system
- successful work on animals will typically open a market for human use

For experimental use in animals, cost figure between 1 to 2,-k€/unit must be considered. Human implants for neurostimulation are in general in order of 8 to 10,-k€/unit.

1.2 Overview of all your main project results

No.	Self-descriptive title of the result	Category A, B or C*	Partner(s) owning the result(s) (referring in particular to specific patents, copyrights, etc.) & involved in their further use
1	IMANE Prosthesis	A	IMANE consortium
2	Active Electrode	A	BME, UBath, EEL, AML, Cerla, PCPM, GREN
3	Multi-polar/multi-stage low noise Amplifier	A	UBath
4	Glass micro-encapsulation	B	AML
5	Optimized silicone rubber metallisation method	A	CERLA & PCPM
6	PEEK Encapsulation	B	NeuroTECH, MATRA
7	Connecting parts	B	NeuroTECH
8	Integrated blocking capacitors	A	EEL
9	Epilepsy model	C	UGent, GREN
10			

* A: results usable outside the consortium / B: results usable within the consortium / C: non usable results

1.3 Quantified Data on the dissemination and use of the project results

Items about the dissemination and use of the project results (consolidated numbers)	Currently achieved quantity	Estimated future* quantity
# of product innovations (commercial)	4	0
# of process innovations (commercial)	0	3
# of new services (commercial)	0	0
# of new services (public)	0	0
# of new methods (academic)	0	1
# of scientific breakthrough	0	3
# of technical standards to which this project has contributed	0	0
# of EU regulations/directives to which this project has contributed	0	0
# of international regulations to which this project has contributed	0	0
# of PhDs generated by the project	0	4
# of grantees/trainees including transnational exchange of personnel	0	0

*# = number of ... / * "Future" means expectations within the next 3 years following the end of the project*

1.4. Comment on European Interest

All projects are expected to meet European interests. This section should provide an appraisal of our project in terms of European added value and support to the implementation of European Union policies.

1.4.1. Community added value and contribution to EU policies

a. European dimension of the problem
(The extent to which the project has contributed to solve problems at European level)

Nowadays the implantable medical device market is dominated by American companies, which have a large experience in that domain. There is a lack of European know-how and technologies in the field of implantable medical devices to be competitive compared with the American solutions. It is vitally important for Europe be present at the forefront of the active implant domain, which is strategic for a rapidly growing number of medical applications. The main challenge is to develop innovative solutions while respecting medical requirements. Within its European network, the IMANE project has developed several new technologies, which are cost effective, of a high degree of miniaturization, integrable in medical applications and of high-performance. A high efficiency neurostimulation device is obtained for applications with improved communication between electronics and the nervous system. This is made possible through high selectivity which improves the information send to the nerve, the analysis of information recorded from the nerve and the interplay between both. Last but not least, an improved industrial fabrication process should lead to efficient production.

b. Contribution to developing S&T co-operation at international level. European added value
(Development of critical mass in human and financial terms; combination of complementary expertise and resources available Europe-wide)

A project such as IMANE requires an international consortium to gather the necessary knowledge and skills to carry through such objectives. The IMANE consortium comprises partners, who have already worked in previous project on the implantable medical device field; this consolidates the links between them and implicitly creates a network of technical skills that is expected to lead to other developments in the future. New partners shared in the project as well and among them, industrial partners, who have a significant impact on the industrial aspects of processes, tools and development. The IMANE partners are localized geographically in three countries: Belgium, France and the United Kingdom. Most of them also have collaborations with laboratories or companies in other European countries. This concentration of laboratories and companies makes contacts easier and the productivity more efficient by concentrating the different fabrication places.

c. Contribution to policy design or implementation
(Contribution to one or more EU policies; RTD connected with standardisation and regulation at Community and/or national levels)

There is no contribution to EU policies in the IMANE project.

1.4.2. Contribution to Community social objectives

a. Improving the quality of life in the Community:

The IMANE system is a collection of generic technologies pertaining to active neural implants. For demonstration purpose it was decided to focus on Vagus Nerve Stimulation (VNS) for epilepsy. Nevertheless, results are much more general and the IMANE know-how as a whole or in parts can be exploited in all applications of VNS (depression, and perspectives in obesity, bowel inflammatory diseases, cardiac problems and many others), in all implanted peripheral nerve stimulation devices (respiratory paralysis, incontinence, peripheral palsies, sensory prostheses) and even in related fields such as Deep Brain Stimulation (DBS), which also has a rapidly increasing spectrum of prospective applications (e.g. Parkinson's disease, Epilepsy, Depression, Touret's Syndrom, Obsessive-Compulsive disorder, etc.). The IMANE project therefore directly participates to the improvement of therapeutical tools for frequent and invalidating diseases. The project should thus contribute significantly to the quality of life in the Community in the coming years.

b. Provision of appropriate incentives for monitoring and creating jobs in the Community (including use and development of skills):

The new technologies developed within the IMANE project provide know how, expertise and networking that should make Europe more competitive in the field of implantable medical device, which is presently often dominated by American Companies. Maintaining the highest level of technological developments in European laboratories is of outmost importance. This has a direct impact on the employment level by allowing European companies to maintain and develop activities in this fast growing high tech domain.

c. Supporting sustainable development, preserving and/or enhancing the environment (including use/conservation of resources) :

The high tech industries tat would benefit from the IMANE project are known for their relatively low environmental cost. In addition, active implants represent a clean form of treatment, devoid of all environment burdens linked to all drug based alternatives.

1.5. Expected project impact (to be filled in by the project coordinator)

Remark: **by replying to the following questions, the coordinator is asked to express his best estimation regarding the impact of the project.**

Overall Policy Impact[1]

EU Policy Goals		I SCALE OF EXPECTED IMPACT OVER THE NEXT 10 YEARS[2] -1 0 1 2 3	II other Not applicable to project	II other Project Impact too difficult to estimate
1. Improved sustainable economic development and growth, competitiveness	Θ	2		
2. Improved employment	Θ	1		
3. Improved quality of life and health and safety	Θ	2		
4. Improved education	Θ	3		
5. Improved preservation and enhancement of the environment	Θ	1		
6. Improved scientific and technological quality	Θ	3		
7. Regulatory and legislative environment	Θ	0		
8. Other _____	Θ		X	

[1] Coordinator should respond to section I or, if appropriate, to section II. If the project has had no impact, a "0" should be entered in section I. Scores other than zero in section I will prompt a more detailed subquestion on a separate screen. However, you may access in any case the subquestions by clicking on the symbol" Θ "following each main question.

[2] Indication for scale as follows: -1 represents negative impact, 0 no impact, 1 small positive impact, 2 medium positive impact , 3 is a strong positive impact

Indicate your replies below by putting in each box the number corresponding to the score you chose:

1. Economic development and growth, competitiveness	**Scale of Expected Impacts over the next 10 years (2)**	
	By Project End -1 0 1 2 3	**After Project End** -1 0 1 2 3
a) Increased Turnover for project participants - national markets	1	2
- international markets	1	2
b) Increased Productivity for project participants	1	2
c) Reduced costs for project participants	0	1
d) Improved output quality/high technology content	2	3

2. Employment	**Scale of Expected Impacts over the next 10 years (2)**	
	By Project End -1 0 1 2 3	**After Project End** -1 0 1 2 3
a) Safeguarding of jobs	2	2
b) Net employment growth in projects participants staff	1	0
c) Net employment growth in customer and supply chains	1	1
d) Net employment growth in the European economy at large	1	2

3. Quality of Life and health and safety	**Scale of Expected Impacts over the next 10 years (2)**	
	By Project End -1 0 1 2 3	**After Project End** -1 0 1 2 3
a) Improved health care	2	3
b) Improved food, nutrition	0	0
c) Improved safety (incl. consumers and workers safety)	2	2
d) Improved quality of life for the elderly and disabled	2	3
e) Improved life expectancy	0	1
f) Improved working conditions	0	1
g) Improved child care	0	1
h) Improved mobility of persons	0	2

4. Improved education	**Scale of Expected Impacts over the next 10 years (2)**	
	By Project End -1 0 1 2 3	**After Project End** -1 0 1 2 3
a) Improved learning processes including lifelong learning	2	3
b) Development of new university curricula	2	1

5. Preservation and enhancement of the environment	**Scale of Expected Impacts over the next 10 years (2)**	
	By Project End -1 0 1 2 3	**After Project End** -1 0 1 2 3
a) Improved prevention of emissions	0	0
b) Improved treatment of emissions	0	0
c) Improved preservation of natural resources and cultural heritage	0	1
d) Reduced energy consumption	0	1

6. S&T quality	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Production of new knowledge	2	2
b) Safeguarding or development of expertise in a research area	3	3
c) Acceleration of RTD, transfer or uptake	2	3
d) Enhance skills of RTD staff	2	3
e) Transfer expertise/know-how/technology	2	1
f) Improved access to knowledge-based networks	1	1
g) Identifying appropriate partners and expertise	2	3
h) Develop international S&T co-operation	2	3
i) Increased gender equality	1	0

7. Regulatory and legislative environment	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3
a) Contribution to EU policy formulation	0	0
b) Contribution to EU policy implementation	0	0

8. Other (please specify)	Scale of Expected Impacts over the next 10 years (2)	
	By Project End -1 0 1 2 3	After Project End -1 0 1 2 3

I, **project co-ordinator**, confirm the published information contained in this part 1 of the TIP.

Signature: **Name: J. Delbeke**

Date: **Organisation: UCL**

Part 2 Description of each result

PARTS 2 WILL BE DISSEMINATED BY THE COMMISSION

2.1 Description of the first result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
1	IMANE Prosthesis

CONTACT PERSON FOR THIS RESULT

Name	Jean DELBEKE
Position	Researcher – co-ordinator for IMANE project
Organisation	Neural Rehabilitation Engineering Laboratory, Université catholique de Louvain
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URL	www.gren.ucl.ac.be
Specific Result URL	

SUMMARY *(200 words maximum)*

The IMANE device is a bidirectional telemetry-controlled implanted micro-system. It comprises an implantable active neural electrode with stimulating and recording functions. The recording function assures a control over the ongoing activity in the nerve (patient status) and monitors the effectiveness of the stimulation.

The possible applications of the IMANE demonstration prosthesis is limited to short term implantations, e.g. for animal experimentation. Long term implantations would require a titanium housing instead of the PEEK encapsulation of the Monitoring unit. With such an encasing, the implant could be implanted in humans as a treatment of neurologic and psychiatric conditions responsive to Vagus Nerve Stimulation (VNS) therapy (pharmaco-resistant epilepsy for example).

At the end of the project, two types of end-users profile will emerge: the research laboratories in neurobiology and the clinical medical therapeutic applications such as used in epilepsy.

The IMANE device possesses three important features: high performance, small size and low cost. The high performance is achieved through the introduction of several new technologies (active multiplexing electrode, metallised silicone, recording channel, implantable connector). Another important characteristic of the IMANE device is the miniaturization of each of its elements. Finally the price of the device should be kept relatively low due to the fabrication process of the PEEK encapsulation (the production cost is lower in comparison with the typical titanium encapsulation) and the electrodes 'on wafer' manufacturing process.

Please categorise the result using codes from Annex 1

Subject descriptors	68	81	382	426	535

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	X
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	**Details (Title, ref. number, general description, language)**	**Status: *PU*=Public *CO*=Confidential**
Web site	http://www.uclouvain.be/sites/imane	PU

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	33	32	85		

2.2 Quantified data about the first result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)	_	_
Number of (public or private) entities potentially involved in the implementation of the result :	_	_
of which : number of SMEs :	_	_
of which : number of entities in third countries (outside EU) :	_	_
Targeted user audience: # of reachable people	_	_
# of S&T publications (referenced publications only)	25	10
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	_	_
# of publications addressing decision takers / public authorities / etc.	_	_
Visibility for the general public	No	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.3 Further collaboration, dissemination and use of the first result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	☐	**FIN**	Financial support	☐
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: J. DELBEKE**

Date: **Organisation: UCL**

2.4 Description of the second result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
2	Active Electrode

CONTACT PERSON FOR THIS RESULT

Name	Nick DONALDSON
Position	Head of Implanted Devices Group
Organisation	University College London
Address	UCL Dept. of Medical Physics & Bioengineering, 11-20 Capper St, WC1E 6JA London UK
Telephone	+44 20 7679 6400
Fax	+44 20 7679 6269
E-mail	nickd@medphys.ucl.ac.uk
URL	www.medphys.ucl.ac.uk
Specific Result URL	

SUMMARY *(200 words maximum)*

The goal of the project is to reduce the size of the electronic components so that, when mounted on the electrode cuff at the end of an implantable cable, the size is acceptable to surgeons. This will enable more subtle interaction between the device and the nerve, such as simultaneous stimulation with multiple electrodes (e.g. 'steering currents') or velocity-selective recording.

However several technical issues must be addressed to ensure long-term reliability for such an implant. In WP6, the following have been investigated:

(i) Testing implantable cable which, by using composite wire has a lower resistance, for under-water fatigue life and electrical transmission properties.
(ii) Life-testing bonds between silicon, used in the package, and PDMS encapsulant, particularly to compare glued bonds with plasma-activated bonds.
(iii) Probably the most critical feature of the implant structure is the electrical connection between the rigid gold vias on the micropackage and the platinum that is deposited on the flexible PDMS. These will be tested under near service conditions.

Please categorise the result using codes from Annex 1

Subject descriptors					

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	X
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	**Details (Title, ref. number, general description, language)**	**Status: *PU*=Public *CO*=Confidential**

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	33	32	85		

2.5 Quantified data about the second result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)		
Number of (public or private) entities potentially involved in the implementation of the result :		
of which : number of SMEs :		2
of which : number of entities in third countries (outside EU) :		
Targeted user audience: # of reachable people		
# of S&T publications (referenced publications only)	0	3
# of publications addressing general public (e.g. CD-ROMs, WEB sites)		
# of publications addressing decision takers / public authorities / etc.		
Visibility for the general public	No	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.6 Further collaboration, dissemination and use of the second result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	☐	**FIN**	Financial support	☐
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: N. de N. DONALDSON**

Date: **Organisation: University College London**

2.7 Description of the third result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
3	Multi-polar/multi-stage low noise Amplifier

CONTACT PERSON FOR THIS RESULT

Name	John TAYLOR
Position	Director, Centre for Advanced Sensors and Sensing (CAST)
Organisation	University of Bath –EEE
Address	Department of Electronic and Electrical Engineering, University of Bath BA2 7AY Bath UK
Telephone	+44-1225-38-3910
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E-mail	J.T.Taylor@bath.ac.uk
URL	www.bath.ac.uk
Specific Result URL	

SUMMARY *(200 words maximum)*

The purpose of this workpackage has been to develop a pair of Application specific integrated circuits (ASICs) to enable velocity selective recording (VSR) to be carried out in real time and the results logged externally. VSR provides a method to increase the functionality of neural recording. Using the relationship between nerve fibre diameter and action potential propagation velocity, VSR allows the level of activity in a particular type of nerve fibre (classified by diameter/velocity) to be measured in real time.

VSR has applications in both neuroscience and also in the provision of inputs for future neural prosthesis systems and products. It will allow real-time measurements to be made on small nerve fibres (difficult using current methods).

The implementation of VSR depends on the availability of (1) an implantable multi-electrode cuff and (2) a suitable low noise, low power recording signal processing system. As mentioned, the recording system consists of two ASICs: and Electrode Unit (EU) which is mounted at the site of the MEC and a Monitor Unit (MU) which is essentially a DMUX unit and is part of the telemetry system. The two are interconnected by means of an implantable cable.

The MU is an all-digital system; it is complete and was delivered in September. The EU is a complex mixed-signal system with 10 analogue input channels and a single multiplexed digital output. The analogue parts of the EU have been tested and a complete system will be available for bench testing in January 2009.

Please categorise the result using codes from Annex 1

Subject descriptors	382	74			

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	X
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	**Details (Title, ref. number, general description, language)**	**Status: *PU*=Public *CO*=Confidential**
Article	"An Implanted System For Multi-Site Nerve Cuff-Based ENG Recording Using Velocity Selectivity", *Analogue Integrated Circuits and Signal Processing*, In Press, 2009.	PU
Article	"Design Strategies for Multi-Channel Low-Noise Recording Systems", ", *Analogue Integrated Circuits and Signal Processing*, In Press, 2009.	PU

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors					

2.8 Quantified data about the third result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)	_	_
Number of (public or private) entities potentially involved in the implementation of the result :	_	_
of which : number of SMEs :	_	_
of which : number of entities in third countries (outside EU) :	_	_
Targeted user audience: # of reachable people	_	_
# of S&T publications (referenced publications only)	_	_
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	_	_
# of publications addressing decision takers / public authorities / etc.	_	_
Visibility for the general public	No	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.9 Further collaboration, dissemination and use of the third result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	☐	**FIN**	Financial support	☐
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: John TAYLOR**

Date: **Organisation: University of Bath –EEE**

2.10 Description of the fourth result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
4	Glass micro-encapsulation

CONTACT PERSON FOR THIS RESULT

Name	Tony ROGERS
Position	Technical Director
Organisation	Applied Microengineering LTD
Address	Unit 8, Library Avenue Harwell Campus DIDCOT, OX11 0SG United Kingdom
Telephone	+44 (0) 1235 833934
Fax	+44 (0) 1235 833935
E-mail	Tony@aml.co.uk
URL	www.aml.co.uk
Specific Result URL	

SUMMARY *(200 words maximum)*

Nature of Results:
Process for "though via" fabrication in all wafer materials
Process for hermetic bottom-up electroplating
Scheme and processes for chip to wafer (C2W) wafer level packaging (WLP)
Hermetic wafer level packaging schemes for glass, silicon, and quartz wafers.

Relevance of Results:
Wafer level packaging is an area of significant research – it is seen as a key means of achieving necessary cost reductions for semiconductor and MEMS fabrication
Wafer level packaging offers reduced volume vs. conventional techniques - significant benefits for implanted devices.
The technology developed in IMANE brings the benefits of wafer level packaging (cost and size reduction) to R&D applications and heterogeneous material systems

Potential:
A solution for chip to wafer packaging that is compatible with multi project wafers (brings the benefits of WLP to applications for which the quantities are too low for conventional WLP to be utilised)
Processes work across a range of materials offering applications in many other fields e.g. aerospace, optics and sensors
Small biocompatible, hermetic packaged chips and sensors offer benefits across a range of implanted applications
Low cost chip-to-wafer approach transferable across a range of materials with low tooling cost offers benefits for bridge to production and low volume packaging of hermetic devices.

Current Status:
Fabricating demonstrators
Developing commercial solutions for implanted sensors with a third party based on this technology

Please categorise the result using codes from Annex 1

Subject descriptors	559	396	397	382	72

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	X
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: *PU*=Public *CO*=Confidential
Technical Publication/Presentation	Hermetic packaging technique featuring through wafer interconnects and low temperature direct bond Ref: No. 24 (Session IV) Smart Systems Integration 2008, (EPoSS, Barcelona, April 2008)	PU
Technical Publication/Presentation	Hermetic packaging technique featuring through wafer interconnects and low temperature direct bond Ref: MicroNano2008-70288 2nd Integration and Commercialization of Micro and Nanosystems – International Conference and Exhibition (American Society of Mechanical Engineers: – June 2008, Hong Kong)	PU
Technical Publication/Presentation	Vacuum Sealed Hermetic Wafer Level Packaging Technique Featuring Through Wafer Interconnects and Low Temperature Direct Bond MicroTech 2008 (International Microelectronics and Packaging Society, Windsor, UK, June 2008)	PU
Technical Publication/Presentation	Versatile Low Cost Implantable Wafer Level Packaging Enabled by Powderblasting Ref: Tu-A-7 2nd Electronics System Integration Technology Conference ('ESTC 2008', London, September 2008)	PU
Technical Presentation	Versatile Low Cost Implantable Wafer Level Packaging Enabled by Powderblasting MEMS/ MST Industry Forum 2008, (SEMI, Stuttgart, October 2008)	PU

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	X			Chip to wafer packaging	☐	☐	
Other - please specify :	☐				☐	X	wafer bonding processes

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	31	33	29	32	35.3c

2.11 Quantified data about the fourth result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)	-	12
Number of (public or private) entities potentially involved in the implementation of the result :	1	5
of which : number of SMEs :	1	5
of which : number of entities in third countries (outside EU) :	0	0
Targeted user audience: # of reachable people	500	700
# of S&T publications (referenced publications only)	0	0
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	5	7
# of publications addressing decision takers / public authorities / etc.	5	7
Visibility for the general public	Yes /~~No~~	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.12 Further collaboration, dissemination and use of the fourth result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	☐	**FIN**	Financial support	☐
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: Tony ROGERS**

Date: **Organisation: Applied Microengineering LTD**

2.13 Description of the fifth result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
5	Optimized silicone rubber metallization method

CONTACT PERSON FOR THIS RESULT

Name	Catherine DUPAS-BRUZEK
Position	Researcher engineer
Organisation	CERLA
Address	Université des Sciences et Technologies de Lille1 59655 Villeneuve d'ascq France
Telephone	+33 (0) 3 20 43 41 63
Fax	+33 (0) 3 20 33 64 63
E-mail	Catherine.Dupas@univ-lille1.fr
URL	http://www.univ-lille1.fr/cerla/
Specific Result URL	

SUMMARY *(200 words maximum)*

CERLA developed a new Pt metallization process of a medical grade silicone rubber. This process consists of irradiating silicone rubber sheets with UV lasers leading to the engraving of tracks and contacts within silicone rubber like for printed circuits. Once, these tracks and contacts are created, they are chemically and physically transformed by UV irradiation compared to native silicone rubber. Silicone rubber is then immersed in a Pt autocatalytic bath and tracks and contacts are selectively metallized with Pt due to their different chemical and physical properties compared to native silicone rubber.

Silicone rubber sheets thus selectively metallized with Pt lead to the formation of a flexible fully biocompatible electrode which can easily be rolled up around nerves. With this process, tracks with small widths (200 µm) and small pitch (400 µm) can be performed leading to an increase of the number of tracks and contacts within the same electrode surface and thus to a miniaturization. This now possible miniaturization induces an improvement of neural selectivity.

Silicone rubber sheets can easily be irradiated in line and then immersed in Pt baths which makes this process fully industrialized.

Please categorise the result using codes from Annex 1

Subject descriptors	76	350	426	593	594

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	X
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	**Details (Title, ref. number, general description, language)**	**Status: *PU*=Public *CO*=Confidential**
Poster	New laser applications in the biomedical field. Salon Européen de la Recherche et de l'Innovation, 5-7 juin 2008, Paris.	PU
Prototype	Laboratory prototype for demonstration	PU
Paper	Transformation of Medical Grade Silicone Rubber under Nd:YAG and Excimer Laser Irradiation : First Step towards a New Miniaturized Nerve Electrode Fabrication Process. Submitted to J. Appl. Phys.	PU
Paper	Pt Metallization of Laser Transformed Medical Grade Silicone Rubber: Last Step towards a New Miniaturized Nerve Electrode Fabrication Process.	PU

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	X	**EP1971704** - 2008-09-24
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	X				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	73	80	85		

2.14 Quantified data about the fifth result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)	-	-
Number of (public or private) entities potentially involved in the implementation of the result :	3	-
of which : number of SMEs :	3	-
of which : number of entities in third countries (outside EU) :	0	0
Targeted user audience: # of reachable people	-	-
# of S&T publications (referenced publications only)	0	2
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	1	-
# of publications addressing decision takers / public authorities / etc.	0	0
Visibility for the general public	Yes / ~~No~~	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.15 Further collaboration, dissemination and use of the fifth result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	X	**FIN**	Financial support	☐
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	X
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

Know how of Pt metallization on silicone rubber. In addition, we have developed in parallel know how of metallization using different metals on different materials.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

All partners (private or public) interested in fonctionalisation of surface materials.

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: Catherine DUPAS-BRUZEK**

Date: **Organisation: CERLA**

2.16 Description of the sixth result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
6	PEEK encapsulation

CONTACT PERSON FOR THIS RESULT

Name	Michel TROOSTERS
Position	NeuroTECH CEO
Organisation	NeuroTECH SA
Address	6, Chemin du Cyclotron B-1348 Louvain-la-neuve Belgium
Telephone	+32 (0) 10 39 00 54
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E-mail	troosters@neurotech.be
URL	www.neurotech.be
Specific Result URL	

SUMMARY *(200 words maximum)*

The PEEK encapsulation is used to protect Monitoring Unit from the internal environment. This type of housing is suitable for short term implantations such as drug delivery or neuromuscular electrical stimulation (NMES) devices.

For the drug delivery, a possible clinical use is the cancer treatment, where the drug could be injected directly into the area of cancerous cells. On the other hand, NMES could be applied for example to therapeutic applications in subjects with spinal cord injury or stroke. Specific therapeutic applications include motor relearning, reduction of hemiplegic shoulder pain, muscle strengthening, prevention of muscle atrophy, prophylaxis of deep venous thrombosis, improvement of tissue oxygenation and peripheral hemodynamic functioning, and cardiopulmonary conditioning[(1)].

According to World Health Organisation, 15 million people worldwide suffer a stroke each year and, among them, 5 million[(2)] are left permanently disabled. While two million people worldwide are living with an Spinal Cord Injury or SCI (i.e. paraplegia and tetraplegia) and around 330 000 people in the Member States of the Council of Europe with about 11 000 new cases every year[(3)].

The use of PEEK instead of titanium for the implant encapsulation has the advantage of reducing strongly the device price. Indeed, in spite of the raw material cost, the production cost is low because the PEEK machining is easier than that of the titanium and the housing complexity is small due to the incorporation of the antennas inside the housing.

(1) Sheffler L.R. & Chae J. **Neuromuscular electrical stimulation in neurorehabilitation**. *Muscle Nerve, 2007; 35(5)*: *562-590.*
(2) Dr J. Mackay & Dr G.A. Mensah, **The atlas of Heart disease and stroke**, *WHO*, September 2004.
(3) M. Oucký, **Towards concerted efforts for treating and curing spinal cord injury**, *Parliamentary Assembly*, March 2002.

Please categorise the result using codes from Annex 1

Subject descriptors	68	72	382	96	480

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	X
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	**Details (Title, ref. number, general description, language)**	**Status: *PU*=Public *CO*=Confidential**
Drawings	IMANE Connector drawing, IMANE case drawing	CO
Demonstrator	IMANE demo	PU
Technical report	Study of the means of closing PEEK case	CO

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	73	85			

2.17 Quantified data about the sixth result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)	_	_
Number of (public or private) entities potentially involved in the implementation of the result :	2	2
of which : number of SMEs :	2	2
of which : number of entities in third countries (outside EU) :	_	_
Targeted user audience: # of reachable people	_	_
# of S&T publications (referenced publications only)	0	0
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	0	0
# of publications addressing decision takers / public authorities / etc.	0	0
Visibility for the general public	No	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.18 Further collaboration, dissemination and use of the sixth result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	☐	**FIN**	Financial support	☐
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: M. Troosters**

Date: **Organisation: NeuroTECH SA**

2.19 Description of the seventh result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
7	Hermetic connecting parts

CONTACT PERSON FOR THIS RESULT

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Specific Result URL	

SUMMARY *(200 words maximum)*

The weak point of implantable medical devices resides often in connecting parts, which must be both watertight and resistant to mechanical stresses. IMANE connector is strongly hermetic and resists to high water pressure. The connectors an automatic locking system, so no screws are required and the connector manipulation is therefore simplified. Moreover, it contains a large number of electrical contacts, with a long-term reliability. These connectors should be integrated into all Active Implantable Medical Devices (AIMDs) with an electrode to interconnect and especially for applications which require a high contact number (i.e. up to seven contacts). This application concerns principally the medical companies who do not want to allocate a research budget over a new connector.

The female connector integrated into the implant may be of different quality: long term reliability or short. The first category uses a feedthrough made out of ceramic, platinum and gold, which is very expensive, and the second one uses a feedthrough made out of a base of PEEK. This distinction allows the product to be present on three markets: the human therapy long term for the long term reliability connector, the experimentation and the human therapy short term for the short term reliability connector.

Please categorise the result using codes from Annex 1

Subject descriptors	68	72	382		

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	X
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	**Details (Title, ref. number, general description, language)**	**Status: *PU*=Public *CO*=Confidential**
Technical report	Hermetic test	CO
drawing	Schematics of the male and female parts of the connector	CO

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	X				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	85	33			

2.20 Quantified data about the seventh result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)	0	9
Number of (public or private) entities potentially involved in the implementation of the result :	5	5
of which : number of SMEs :	3	3
of which : number of entities in third countries (outside EU) :	0	0
Targeted user audience: # of reachable people	1	2
# of S&T publications (referenced publications only)	0	0
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	0	0
# of publications addressing decision takers / public authorities / etc.	0	0
Visibility for the general public	No	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.21 Further collaboration, dissemination and use of the seventh result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	☐	**FIN**	Financial support	☐
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: M. Troosters**

Date: **Organisation: NeuroTECH SA**

2.22 Description of the eighth result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
8	Integrated blocking capacitors

CONTACT PERSON FOR THIS RESULT

Name	Dr Andreas Demosthenous
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Telephone	+44 20 7679 3189
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Specific Result URL	

SUMMARY *(200 words maximum)*

One of the main technological challenges in the IMANE project is miniaturization of the physical size of the implantable neural stimulator. Conventional neural stimulators use external off-chip blocking capacitors for DC protection in the event of semiconductor failure. For a multi-channel stimulator, the use of these external capacitors results in large physical volume. WP4 tackled this problem by proposing a novel high-frequency current-switching (HFCS) stimulation scheme. The technique allows the blocking capacitors to be integrated on chip alongside with the rest of the stimulator circuitry, hence achieving full system integration.

The novel HFCS resulted in the world's first fully-integrated neural stimulator that is fail-safe without the need for off-chip blocking capacitors. Two different prototype stimulators using the HFCS technique have been fabricated so far. The modular structure of the ASIC allows the construction of a multi-channel stimulation and recording system by simply connecting multiple ASICs together. For the prototype stimulator ASIC, the stimulation parameters have been optimized for the IMANE project, which mainly focuses on vagus nerve stimulation. However, the novel circuit techniques developed in WP4 (e.g., HFCS, new current generator circuit, etc) can be easily used for other neural stimulation applications, such as retinal, cochlear and nerve route stimulators, offering mass volume reduction.

The prototype stimulator ASIC using HFCS has been successfully evaluated both in-vitro and in-vivo. The stimulator ASIC conforms to the requirement of fail-safe under single-failure conditions. The measured DC leakage current using this stimulator ASIC was characterised with Platinum electrodes in a saline tank, and was found to be well below the current safety limit. The size reduction and full-system integration offered by the novel stimulator ASIC also benefits other parts of the implant design chain, such as more flexibility in packaging, reduced cost, minimized cross-talk between components and enhanced reliability.

Please categorise the result using codes from Annex 1

Subject descriptors	186	192	382	535	550

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	X
Results of demonstration trials available	☐
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	Details (Title, ref. number, general description, language)	Status: *PU*=Public *CO*=Confidential
Article	"An integrated implantable stimulator that is fail-safe without off-chip blocking capacitors," *IEEE Trans. Biomed. Circuits Syst.*, vol. 2, no. 3, 2008.	PU
Article	"Platinum electrode noise in the ENG spectrum," *Med. Biol. Eng. Comput.*, vol. 46, no. 10, pp. 997-1003, 2008.	PU
Article	"In vitro evaluation of a high-frequency current-switching stimulation technique for FES applications," in *Proc. 13th IFESS Conf.*, pp. 291-293, 2008.	PU
Article	"Five valuable functions of blocking capacitors in stimulators," in *Proc. 13th IFESS Conf.*, pp. 322-324, 2008.	PU
Article	"A fail-safe ASIC for implantable neural stimulation," in *Proc. 33rd European Solid State Circuits Conf.*, pp. 460-463, 2007.	PU
Article	"Recent Advances in the Design of Implantable Stimulator Output Stages," in *Proc.* European *Conf. Circuit Theory and Design*, pp. 204-207, 2007.	PU
Article	"Implantable Stimulator Failures: Causes, Outcomes, and Solutions," in *Proc. 29th Annu. Int. Conf. IEEE Engineering in Medicine and Biology Society*, pp. 5786-5789, 2007.	PU
Article	"A Safe Transmission Strategy for Power and Data Recovery in Biomedical Implanted Device," in *Proc. IEEE Int. Symp. Circuits and Systems*, pp. 2367-2370, 2007.	PU
Article	"A Fully Integrated Fail-safe Stimulator Output Stage Dedicated to FES Stimulation," in *Proc. IEEE Int. Symp. on Circuits and Systems*, pp. 2076-2079, 2007.	PU
Article	"A Miniaturized, Power-efficient Stimulator Output Stage based on the Bridge Rectifier Circuit," in *Proc. IEEE Asia Pacific Conf. Circuits and Systems*, pp. 498-501, 2006.	PU
Prototype	A single-channel stimulation system incorporating both stimulation and recording functions	IN
Prototype	A fail-safe multi-channel stimulation system (stimulation only)	IN

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	33	73	85		

2.23 Quantified data about the eighth result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)	_	_
Number of (public or private) entities potentially involved in the implementation of the result :	_	_
of which : number of SMEs :	_	_
of which : number of entities in third countries (outside EU) :	_	_
Targeted user audience: # of reachable people	_	_
# of S&T publications (referenced publications only)	10	3
# of publications addressing general public (e.g. CD-ROMs, WEB sites)	_	_
# of publications addressing decision takers / public authorities / etc.	_	_
Visibility for the general public	Yes / No	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.24 Further collaboration, dissemination and use of the eighth result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	*X*	**FIN**	Financial support	*X*
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	*X*
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

In the Analogue and Biomedical Electronics Group at UCL, which is part of the Sensors Circuits and Systems Group (http://www.ee.ucl.ac.uk/research/mro) there are 10+ researchers working on the design of implantable electronics and associated applications. We have extensive back-to-front design expertise in designing stimulator and recording electronics using integrated circuits. In the FP6 IMANE project, we designed two different prototype ASICs for implanted devices. The first ASIC is a multi-channel, fully-integrated stimulator which is fail safe without the need for off-chip blocking capacitors. The DC leakage of this new stimulator ASIC is below 12nA, which is well below the recommended safety limits. The small DC leakage current guarantees that there will be no charge accumulation at the electrode-tissue interface in long term use. The second ASIC is single-channel stimulation + recording system with minimized cable count. The modular structure of this ASIC allows the construction of a multi-channel stimulation and recording system by simply connecting multiple ASICs together.

The significant size reduction and full-system integration offered by our novel stimulator ASIC can also benefit many other parts in the implant design chain, such as more flexibility in packaging, reduced cost, easy system management, minimized cross-talk between components and enhanced reliability.

Many of our research results have been disseminated in journals and international conferences. Some of the results have also been covered by both national and international medias.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

Expertise in micro-packaging for implanted devices
Access to facilities for animal experiments
Need to design miniaturised instrumentation for biomedical applications

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: Dr Andreas Demosthenous**

Date: **Organisation: University College London**

2.25 Description of the ninth result

No. & TITLE OF RESULT

No.	Self-descriptive title of the result
9	Epilepsy model

CONTACT PERSON FOR THIS RESULT

Name	Kristl Vonck
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E-mail	Kristl.Vonck@UGent.be
URL	
Specific Result URL	

SUMMARY *(200 words maximum)*

Animal research using functional electrical stimulation (FES) of the vagus nerve (VNS) is usually performed in rats with epilepsy that are too small for the electrode that was designed within this EU-project. This workpackage focused on the identification of another animal in which the newly designed electrode could be tested.

Horses are known to be susceptible to a disease of the vocal cords that are innnervated by the recurrent laryngeal nerve (RLN) that branches of the vagus nerve (VN). FES may be a suitable treatment option. For the identification of a larger animal model dissection of the VN and RLN was performed in a deceased horse. As a pilot it was decided to implant a commercially available VNS system around the recurrent laryngeal nerve because the available electrodes from this system do not exceed 3 mm.

Intraoperative neurostimulation with combined intraoperative laryngoscopy was performed and neurostimulation at 30-60 Hz and 2 mA clearly evoked laryngeal cord abduction. A full stimulation parameter protocol using the implanted system and laryngoscopic evaluation in the horse in an awake condition was performed resulting into a rheobase/chronaxy curve for the RLN. Using a stimulation-recording set-up a full compound action potential map can be evaluated.

Please categorise the result using codes from Annex 1

Subject descriptors	426				

CURRENT STAGE OF DEVELOPMENT

Please tick one category only 4

Scientific and/or Technical knowledge (Basic research)	☐
Guidelines, methodologies, technical drawings	☐
Software code	☐
Experimental development stage (laboratory prototype)	☐
Prototype/demonstrator available for testing	☐
Results of demonstration trials available	X
Other (please specify.):	☐

DOCUMENTATION AND INFORMATION ON THE RESULT

List main information and documentation, stating whether public or confidential.

Documentation type	**Details (Title, ref. number, general description, language)**	**Status: *PU*=Public *CO*=Confidential**
Abstract/poster Robrecht Raedt	Left recurrent laryngeal nerve stimulation in horses; presented at the Belgian Brain Congress, Ostend, 24.10.2008	PU
Abstrac/poster Kathleen Van Schandevijl	Functional electrical stimulation of the left recurrent laryngeal nerve with an implanted vagal nerve electrical stimulation device in a normal horse	PU
Scientific manuscript in preparation by Robrecht Raedt and Kathleen Van Schandevijl	In preparation	PU

INTELLECTUAL PROPERTY RIGHTS

Type of IPR	**KNOWLEDGE:** **Tick a box and give the corresponding details (reference numbers, etc) if appropriate**					**Pre-existing know-how** **Tick a box and give the corresponding details(reference numbers, etc) if appropriate**	
	Current				**Foreseen**	**Tick**	**Details**
	Tick	**NoP [1)]**	**NoI [2)]**	**Details**	**Tick**		
Patent applied for	☐				☐	☐	
Patent granted	☐				☐	☐	
Patent search carried out	☐				☐	☐	
Registered design	☐				☐	☐	
Trademark applications	☐				☐	☐	
Copyrights	☐				☐	☐	
Secret know-how	☐				☐	☐	
Other - please specify :	☐				☐	☐	

1) Number of **P**riority (national) applications/patents
2) Number of **I**nternationally extended applications/patents

MARKET APPLICATION SECTORS

Please describe the possible sectors for application using the NACE classification in Annex 2.

Market application sectors	73m				

2.26 Quantified data about the ninth result

Items (about the results)	**Actual current quantity [a]**	**Estimated (or future) quantity [b]**
Time to application / market (in months from the end of the research project)	_	_
Number of (public or private) entities potentially involved in the implementation of the result :	_	_
of which : number of SMEs :	_	_
of which : number of entities in third countries (outside EU) :	_	_
Targeted user audience: # of reachable people	_	_
# of S&T publications (referenced publications only)		
# of publications addressing general public (e.g. CD-ROMs, WEB sites)		
# of publications addressing decision takers / public authorities / etc.	_	_
Visibility for the general public	Yes	

[a] *Actual current quantity = the number of items already achieved to date.*
[b] *Estimated quantity = estimation of the quantity of the corresponding item or the number of items that you foresee to achieve within the next 3 years.*

2.27 Further collaboration, dissemination and use of the ninth result

(Optional; to be completed if partner is willing to set up new collaborations, and seeking dissemination support from the CORDIS services.)

COLLABORATIONS SOUGHT

Please tick appropriate boxes (4) corresponding to your needs.

R&D	Further research or development	☐	**FIN**	Financial support	☐
LIC	Licence agreement	☐	**VC**	Venture capital/spin-off funding	☐
MAN	Manufacturing agreement	☐	**PPP**	Private-public partnership	☐
MKT	Marketing agreement/Franchising	☐	**INFO**	Information exchange	☐
JV	Joint venture	☐	**CONS**	Available for consultancy	☐
			Other	(please specify)	☐

POTENTIAL OFFERED FOR FURTHER DISSEMINATION AND USE

Please, clearly describe your input, the value and interest of the applications and the dissemination and use opportunities that you can offer to your potential partner.

PROFILE OF ADDITIONAL PARTNER(S) FOR FURTHER DISSEMINATION AND USE

Please, clearly describe the profile and the expected input from the external partner(s).

I confirm the information contained in part 2 of this Technological Implementation Plan and I authorise its dissemination to assist this search for collaboration.

Signature: **Name: Kristl Vonck**

Date: **Organisation: Ghent University Hospital**