Province de Liège
Enseignement

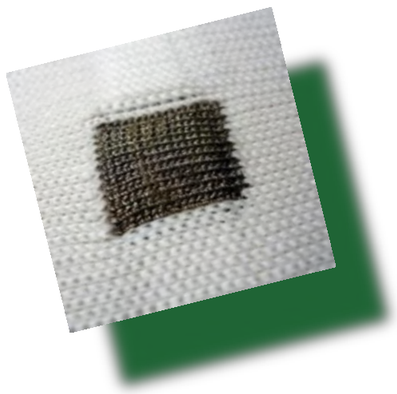
Haute Ecole de la Province de Liège

TEXTILE ELECTRODE

Medical Applications

Electroconductive textile

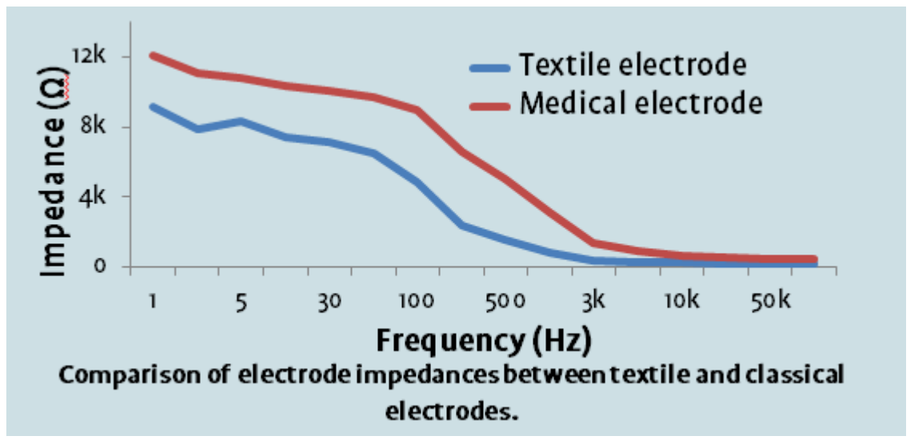
We used textile electrodes made of silver-coated polyamide fibers. These double knitted jersey electrodes provide good quality recordings. Several sizes and shapes were investigated to achieve the desired performances.



A simple textile electrode, made of knitted silver-coated fibres.

Electrode behaviour

We compared our electrode to a standard medical one. The following graph shows the impedance of the two electrodes both used in conjunction with gel.



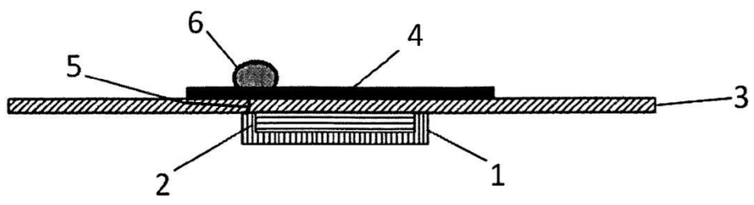
Comparison of electrode impedances between textile and classical electrodes.

SURNISOM

Non-Invasive Sleep Monitoring

Patent pending

Maintaining a good contact quality during an entire night is critical. In our first experiments, we noticed that the gel tended to evaporate within a few hours. To overcome this issue, we added an impermeable layer to the electrode. A patent is pending (WO 2012/007 384) for the electrode structure described below.



Multilayer structure of the electrode.

Integration in a prototype

Our electrodes easily fit in fabric prototypes thanks to their textile nature. The following pictures show these electrodes directly integrated in a prototype headband.

Prototype with textile electrodes.

CIPESTIM

Ceinture Intelligente Pour l'ElectroSTIMulation

Electrotherapy is a tissue processing technique that involves stimulating nerves or muscles using weak electric currents. Such treatment can relieve muscles or joint pain, improve physical surgery or regain muscle size after prolonged immobilization. The project CIPESTIM aims to achieve a smart belt TENS electrotherapy.

Principle of the matrix. By activating electrodes side by side, we can create larger effective electrodes and shapes.

Prototype panel containing 6 textile electrodes.

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ECOTEPE asbl
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Wallonie

nomics
Signal Engineering

MACAFFIN : Increasing humanized antibody affinity

Introduction

Monoclonal antibodies are playing an increasing role in drug therapy. Most of them are generated as rodent antibodies and induce an adverse immune response when injected into humans. Modifying antibody sequences aims to decrease their immunogenicity but often leads to a loss in either affinity or specificity or both. This project aims to develop a quick humanisation process of murine antibodies leading to the production of high affinity/specificity humanised antibodies. The developed procedure includes four steps :

1. **Indentification of the murine CDR sequences and cdr-grafting**

   Antibody humanisation by CDR-grafting consists of the insertion of the murine complementary determining regions (CDR) into a human variable regions framework. Antibody specificity and affinity are determined by CDR sequences but also CDR structures and relative positions. So that human framework sequences and murin CDR séquences have to be chosen carefully by bioinformatics analysis (figure 1).

2. **Molecular modeling and site-directed mutagenesis**

   If the grafted antibody shows a loss in affinity or specificity, amino acids affecting CDR positioning and light and heavy chain angulation are selected for mutation back to the murine sequence.

3. **Production of humanised antibodies**

   Engineered antibodies are produced in human HEK293 cell lines and affinity purified.

4. **Specificity and affinity détermination**
   - ELISA
   - KD, Koff, Kon are measured by bio-layer interferometry.

We are looking for partnerships to submit new projects within the fields of antibody engineering or protein engineering.

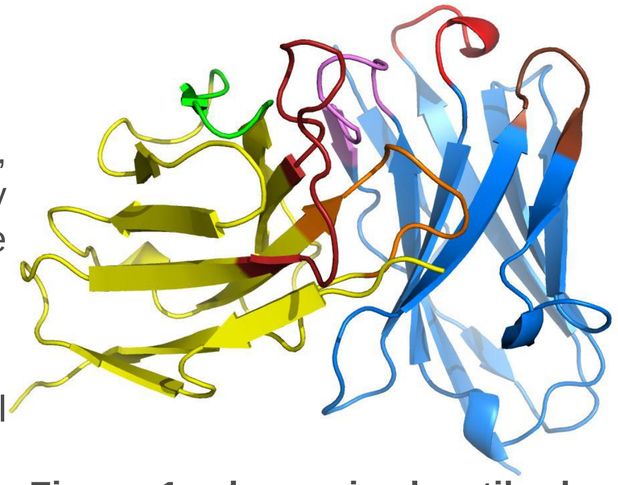

Figure 1 : humanized antibody : variable region modeling. Mouse derived CDR, Chothia definition (H1 red, H2 brown, H3 violet, L1 firebrick, L2 green, L3 orange), human heavy chain framework (blue), human light chain framework (yellow).

Centre de Recherche des Instituts Groupés

http://www.crig.eu/

Université de Liège – Center for Protein Engineering

http://www.cip.ulg.ac.be

CERgroupe - Biotechnologie

www.cergroupe.be

Health Research and Biotechnology

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Purification of volatile fatty acids (VFA) produced from acidogenic fermentation of lignocellulosic compounds

Step 1 : Concentration of VFA such as acetic, propionic, butyric and lactic acids from acidogenic fermentation broth by using electromembrane techniques combined with ionic exchange resins.

Step 2 : Separation of concentrated volatile fatty acids by using resins (reverse phase, HIC or ionic exchange).

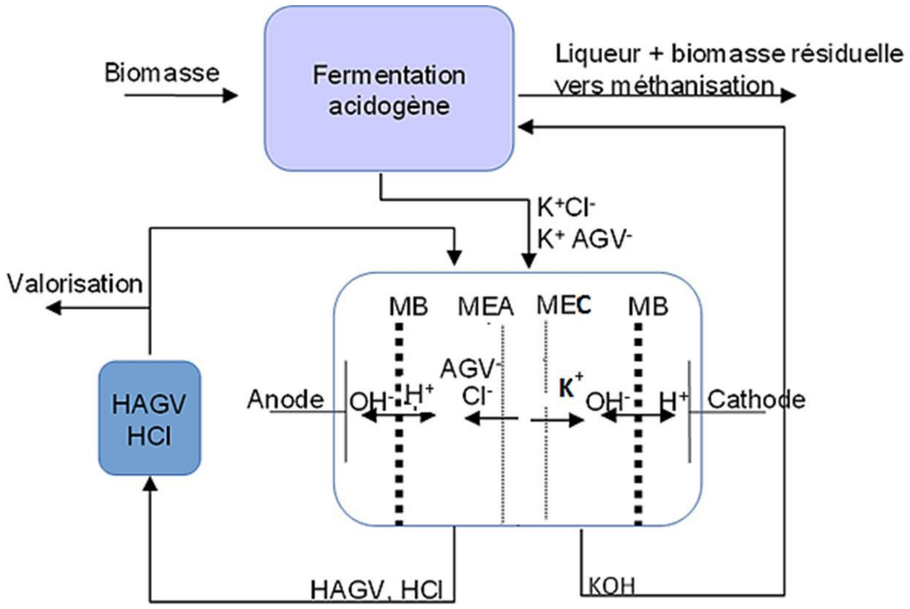

Figure n°1 : Step 1 – electromembrane techniques in a loop on the fermentation vessel

Feed is « fermentation liquor » which contains salts of VFA, proteins, polysaccharides and inorganic salts.
VFA anions migrate to the positive anode through the anionic exchange membrane.
Potassium cations migrate to the negative cathode through the cationic exchange membrane.
VFA acids could be concentrated on resins to increase the conductance of the system.
Separation of the VFA from each other could be done by preparative chromatography.
The alcaline residues (potassium hydroxyde) should be reused to regulate the pH of the acidogenic fermentation.

This is only a proposal not yet validated on a technical point of view.
We are looking for potential partners in order to submit this project at a European level.

CERISIC

Centre of Studies and Researches associated to the Technical Department of the HELHa

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Research areas

Mechanical & Thermic Engineering
Electrical & Electronic Engineering
Chemical & Biotechnological Engineering

Existing partnerships

UCLouvain
GreenWatt

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Hochschule Geisenheim University

in step with actual practice / modern / globally connected

Research at Hochschule Geisenheim University (hs-gm) concentrates on special crops and studies the entire value chain, from the surrounding environment and the plant itself to processing and quality control of their products as well as marketing and business economics of associated enterprises. A particular focus uniting most research groups at hs-gm are the effects of climate change on special crops and their products.

The Geisenheim FACE for Special Crops: Free Air Carbon Dioxide Enrichment

The Geisenheim FACE experiment for special crops is assessing the effects of increasing atmospheric CO_2-concentrations on cultivation, physiology, pest and disease pressure as well as on quality of grapes and vegetables.

The federal state of Hessen supports the Geisenheim FACE experiment within the LOEWE program for research excellence.

LOEWE
Exzellente Forschung für Hessens Zukunft

Exemplary other projects

Symptoms of vascular wilt in lamb´s lettuce (*Valerianella locusta*): Various biotests, pyro-sequencing and metabolomics are applied to identify putative causal agents of this disease, which is the basis for the design of new control strategies.

Development of molecular markers for columnar growth of apple: Transposon insertion responsible for phenotype is studied by over-expression and knockout on transgenic lines followed by transcriptomics.

Biodiversity in yeast: Identification of individual yeast species and strains via FTIR spectroscopy and its application in enology and beverage production

Hochschule Geisenheim University

Geisenheim, Germany

Research Areas:

Viticulture, Enology, Wine Business, Beverage Technology, Horticulture and Landscape Architecture.

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HAN-0014

“Post-doctoral opening for EU funding application”

We’re looking for:

A **Postdoctoral researcher** with at least one publication as first author in a high impact factor journal (Impact factor 5 or higher) preferably related to the area of cardiovascular or cancer biology. Previous experience in **molecular biology and cardiovascular physiology** would be ideal but not essential

Investigation of the molecular mechanisms that regulate calcium-dependent signal transduction pathways in cancer and cardiovascular pathophysiology. We are particularly interested in the role of the Plasma Membrane Calcium ATPase (PMCA) proteins as negative regulators of the calcineurin and eNOS calcium-dependent signalling pathways.

Using in vitro and in vivo models we have recently established that the interaction PMCA4-calcineurin inhibits VEGF-mediated angiogenesis. We have also established that in breast cancer cells, the interaction PMCA2-calcineurin protects breast cancer cells from paclitaxel-induced apoptosis. Therefore, targeted disruption of the PMCA-calcineurin interaction in specific cells can be used with therapeutic purposes to enhance the formation of blood vessels in cardiovascular ischemic patients, or to improve paclitaxel-mediated cytotoxicity of tumoral cells in patients with breast cancer.

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Other postdoctoral openings are available in the University. If you’re interested, please, contact us for more information

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More than 100 partnerships in more than 50 projects

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