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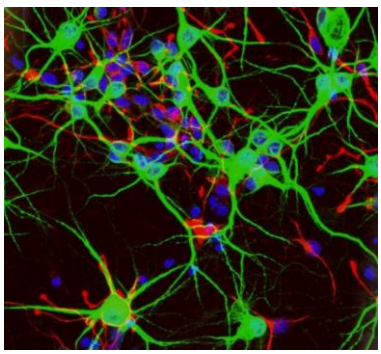
INNOVATION & KNOW HOW

NEUROSCIENCE

SUBSTRATES FOR CULTURING AND STIMULATING CELLS



Keywords

- 3D cell network
- electrical stimulation
- low cost fabrication
- nanopillars
- Nanostructured surface
- three-dimensional environment

The present invention relates to the use of a substrate comprising a textured surface with a plurality of protrusions and a bulk portion, for promoting neural cell network growth in vitro and/or ex-vivo; for a culturing method and for complex neural cell 5 network reconstruction. The invention also relates to the use of a substrate for cell stimulation, and to a probe, a stimulation device, and a monitor device comprising the substrate and their medical uses.

Description

This project includes **the development of a new generation of sensors and electrodes based on nanotechnological materials of neural interfacing**. The aims is to design and produce a **prototype of an active implant that could work directly at the spinal-cord level**. This implant will allow restoring the transmission of electrical signals in injured axon tracks of the spinal cord. Due to some limitations, electrodes are currently placed at the

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brain to detected electric potentials, or at the muscles to trigger functional electrical stimulation (FES).
The research proved that the nano-structure of these electrodes can offer an enhanced adhesion as well as efficiency when compared to conventional FES electrodes. The main object of the project is to develop a cost-effective, biocompatible and easy to use. The use of the substrate of the invention wherein its textured surface has a plurality of protrusions, it presents improved interaction with cells and allows the growing of active cell cultures on it.

Inventors

SISSA: Laura Ballerini; Ivo Calaresu; Rossana Rauti; Denis Scaini

Fundación Instituto Madrileño de Estudios Avanzados en Nanociencia - IMDEA Nanociencia: Isabel Rodríguez Fernández; Jaime J. Hernández Rueda; M. Teresa González Pérez; Lucas Pérez García; Julio Camarero de Diego; Rodolfo Miranda Soriano

Results

The Technology is validated in the laboratory

Advantages and Innovative features of the Solution

- Low cost thanks to the hot-pressing procedure of the polymeric surface for nano-structuring;
- High performance;
- Highly controllable substrates;
- Manufacturing procedure useful in various applications.

Potential Applications

The invention could be, for example massively used by biotech and medical industries to fabricate novel substrates to:

- Improve cell/substrate adhesion to electrodes;
- Create new device to grow cells for 3D biotech studies;
- Electrically stimulate laboratory cell cultures for biotech studies.

Target Companies

The invention could be, for example massively used by **biotech and medical industries** to fabricate novel substrates to:

1) improve cell/substrate adhesion to electrodes;

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2) create new device to grow cells for 3D biotech studies;

3) electrically stimulate laboratory cell cultures for biotech studies

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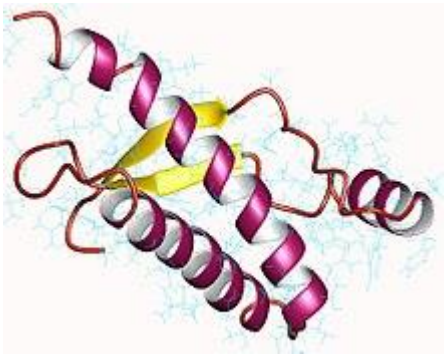
SERPIN INHIBITORS FOR THE TREATMENT OF PRION AND PRION LIKE DISEASES



Keywords

- Prion and piron-like disorders
- Serpina3 inhibitors

Description

To date, despite numerous active efforts, there are no drugs available for the cure of the neurodegenerative diseases collectively referred as prion and prion-like disorders. Symptomatic treatment is the only available option, including the administration to patients of antipsychotics, such as quetiapine and clonazepam, to treat myoclonus, and of selective serotonin re-uptake inhibitors (SSRIs) to treat depression.

Indeed, through this invention, we are presenting a new class of small molecules acting as SERPINA3 inhibitors, which are able to reduce PrPSc accumulation in prion-infected cell lines, thereby representing a new therapeutic treatment against prion and prion-like diseases.

The development of specific inhibitors of SERPINA3 with an activity in the nanomolar range is expected. The characterization of structural models of the binding of the small molecules with the protein should allow the identification of novel inhibitors with improved potency.

Applications

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Compounds for use in the therapeutic treatment of a prion or prion-like disease and to pharmaceutical compositions comprising these compounds

Scientific Reference

Prof. G. Legname

DIAGNOSIS OF NEUROGENERATIVE DISORDERS - INNOVATIVE MOLECULAR TECHNIQUES FOR AN EARLY AND DEFINITIVE DISEASE DETECTION

Keywords

- Infectious prion proteins
- Biomarkers
- Dementia
- Patient stratification

Description

RT-QuIC and PMCA are fast in vitro assay that can detect disease-specific biomarkers with high sensitivity and specificity thus enabling early and definitive diagnosis of Neurodegenerative Diseases. These two techniques enable the detection of minute infectious prion proteins (undetectable by current diagnostic techniques) in peripheral tissues (e.g. urine, blood, cerebrospinal fluid and olfactory mucosa) of patients in early stages of Neurodegenerative Diseases and can model the process of protein misfolding and aggregation in vitro.

Main advantages

The two approaches are fast and can achieve an early and definitive diagnosis of dementia without the need of costly and invasive procedures. It is possible to obtain patients stratifications' useful for diagnostic and therapeutic purposes and assess the efficacy of

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different and innovative therapeutic compounds or drugs to interfere with the individual misfolding process. Moreover, the techniques will allow the specific monitor of disease progression by analyzing the variation of disease-specific biomarkers, providing the patients with the most efficient compounds able to interfere with the molecular events and not only with the symptoms of the diseases.

Scientific Director

Giuseppe Legname earned his Doctor of Philosophy at the University of Warwick, UK. After a long spell in industry in the field of immunotherapy, he moved to the National Institute for Medical Research (NIMR), Medical Research Council in London, UK as a Research Associate. In 1999 he became Assistant Adjunct Professor, and later Associate Adjunct Professor, at the Institute for Neurodegenerative Diseases (IND), University of California at San Francisco, USA, under the direction of 1997 Nobel Laureate Professor Stanley B. Prusiner. Currently he is the Coordinator of the Joint PhD Program in Molecular Biology (JuMBO) at SISSA and the Director of SISSA Laboratory of Prion Biology

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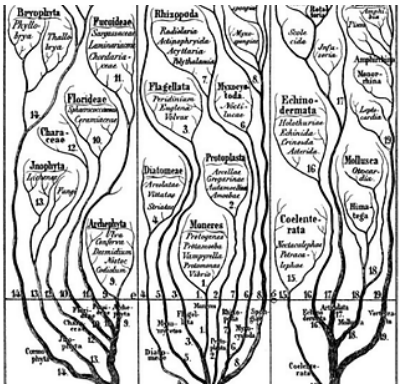
COMPUTATIONAL GENOMICS LAB



Keywords

- Junk DNA, non-coding DNA
- Adverse Drug Reaction / Personalized medicine
- Next generation sequencing / Exome sequencing / Whole genome sequencing
- Mutation detection

Computational Genomics Lab in the Neuroscience department at SISSA

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*Identification of **genetic profiles** by analyzing the exome and whole genome sequencing data with special regards to **junk DNA**, a new opportunity to understand the **variability of the response** in drug treatments.*

Description

The **Computational Genomics Lab** is composed of **biologists and computer scientists who combine molecular biology and functional genomics with the development and analysis of bioinformatics pipelines**.

The laboratory studies the organization of the genome, its transcriptional output, the activity and evolution of **non-coding DNA** and **transposons** (also called **junk DNA**). The focus relies on how these features shape the genomes of living organisms and are involved in the establishment of diseases and illnesses, with a strong focus on health, the nervous system and somatic variations.

The laboratory specifically develops **bioinformatics pipelines** able to analyze a large number of data produced by functional genomics platforms in particular sequencing machines of the latest generations.

Thanks to this expertise the laboratory can analyze the sequence of the genome of any individual and can also identify variations determined by junk DNA at different stages of life and their relation to the responses of our genes to environmental and life-style change.

Scientific Background

Remo Sanges is the coordinator of the laboratory is a molecular and computational biologist with extensive experience in development and usage of bioinformatics pipelines, data integration and harmonization, tools, methods and databases for large-scale functional genomics data analysis and more than 15 years of teaching experience.

Results

The laboratory has developed different bioinformatics pipelines to analyze sequencing data, annotate genomic regions, finding gene clusters, mining and annotating de-novo generated transcriptomes. These tools are widely used by the community and regularly cited.

The latest developments regard the identification and prioritization of mutations/variations potentially associated to specific diseases and phenotypes. The computation genomic lab's pipeline, differently from other standard ones, is capable to identify also mutation generated by the activity of junk DNA (transposable elements) and uses ad-hoc developed prioritization modules capable to increase the rate of annotation and identification of potentially causative variants.

Advantages and Innovative features of the Solution

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This expertise allows **to profile DNA** being capable to analyze also all those regions of the human genome which have not been considered so far (non-coding and transposons) and that can contain important information also potentially related to the variability of the response of a patient to a given drug.

Main advantages

Complete analysis of a genetic profile

Custom bioinformatics analysis on exome and whole genome sequencing data

Combination of molecular and computational biology skills

Potential Applications

This expertise is of potential interest in the field of personalized medicine.

Variability in the response to drug treatment between patient and patient is one of the major problems in clinical practice. Individual responses to drugs vary widely.

In addition to factors such as age, sex and lifestyle, it is believed that hereditary factors have an important role in the individual response to drugs.

The clinical consequences of this can represent in the pharmacological treatment a therapeutic failure with lack or only partial efficacy of the therapy, constituted by side effects of the active principle or by serious and sometimes fatal adverse reactions.

Information about some of the specific responses of a patient could therefore be contained **in his/her genetic profile**. Genomics studies, along with the study of the so-called junk DNA, have the potential to predict the response of patients to certain drugs keeping into account crucial genetic information to be used by clinicians to decide the optimal therapy and personalize the dosages.

The benefits will consist in a reduced incidence of adverse reactions, in better clinical outcomes and in reduced costs.

Target Companies

Drug discovery companies interesting in a personalized medicine

Pharmacological

Pharmacogenetic

Companies Contract Research Organization (CRO)

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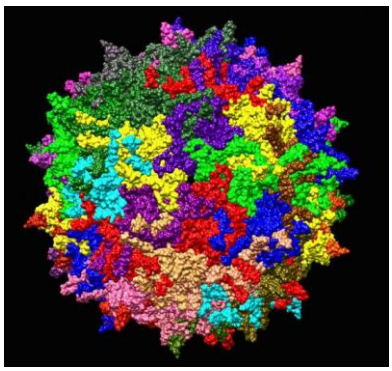
TURBOCHARGING GENE DELIVERY WITH AAV-BOOSTER TECHNOLOGY



Keywords

- Adeno-associated virus (AAV)
- Interaction
- Cell nucleus

Description

Adeno-associated virus (AAV) has become the gene delivery vector of choice in both basic research and clinical development. However, because AAV particles are relatively ineffective at transducing most cell types, high titers are required for efficient gene transfer. This in turn raises production costs substantially.

We have developed technology to dramatically increase AAV infectivity and drive down costs. Our approach relies on **chemical modification of the viral coat to increase its interaction with cells**. The technology can be applied to any AAV vector post-production, reducing the amount of virus required for gene delivery by more than tenfold.

Scientific Background

Through **chemical modification of the viral capsid**, we **increase binding of the virus to cell surface carbohydrates**. This in turn improves transduction through i**ncreased internalization and transportation of AAV particles to the cell nucleus**.

Results

We have tested the technology with several viral serotypes in vitro (cell culture) and in vivo (injections in mouse). We are currently quantifying efficiency increases across different serotypes. Upon completion, the technology is ready to be marketed.

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Advantages and Innovative features

There are enormous challenges in producing AAV in sufficient quantities for efficient gene transfer. This is reflected in the multitude of different manufacturing platforms that are used for AAV production and purification. The advantage of our technology is **it can be easily applied to any AAV produced using any of these platforms**. This means that AAV suppliers or users are not restricted to a specific serotype or production method, and any AAV they have in stock can be easily modified. The results are a significant increase in gene transfer efficiency, which translates into major savings in production time and cost.

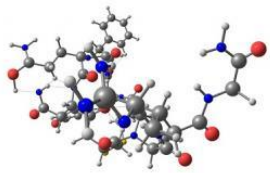
Potential Applications / Target Companies

Potential targets include AAV users/scientists, AAV production core facilities (TIGEM, ICGEB, UNC Vector Core, Penn Vector Core, UZH Viral Vector Facility etc), and AAV production companies (Vector Biolabs, Vigene Biosciences, GeneCopoeia, Creative Biogene etc).

Scientific Director

Prof. Paul Heppenstall

PEPTIDE PROBES AS FAST ANALYTICAL METHOD OF TARGET MOLECULES



Keywords

- Designed peptides
- Computational protocol
- Bionsensors
- Nonstandard conditions

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Description

The **proprietary computational protocol** - developed by *prof. Laio* - is capable to **optimize the sequence and binding conformation of peptides that recognize** with high affinity and specificity **the structure of a selected molecule in any solvent environment**. *In silico* design of peptides takes advantage of the growing computing power and the accuracy enhancement of binding affinity predictions to optimize from scratch peptides as binders of specific targets. **Peptides can be designed specifically for the structural recognition of any organic molecule** under any environmental conditions, which can be previously chosen and they can be used in **biosensors** (Cosmetics, Environment, Food Safety, etc.) in order to monitor and screen routinely and at a low cost the presence of the target molecule.

Main advantages

i) **Fast and low-cost synthesis of peptides** (cheaper than antibodies);

ii) Designed specifically to work in **nonstandard environment conditions** (organic solvents, high temperature, non-neutral pH, etc.);

iii) Possibility to be exploited in **low-cost monitoring devices**;

Collaboration

Joint activity in **the peptide design and implementation** (as well as its operational validation) for the recognition of a specific molecule proposed by the Industrial Partner, who will be entitled to negotiate an exclusive right of commercial exploitation of the final product.

Scientific director

Alessandro Laio is **Full Professor in the Statistical and Biological Physics sector at SISSA**. His main research and scientific activity is focused on the development of techniques related to enhancing the capability of computer simulations to provide predictive answers for complex heterogeneous systems. At the moment, he is also the President of the *Centre Européen de Calcul Atomique et Moléculaire* (CECAM) in Lausanne, Switzerland.

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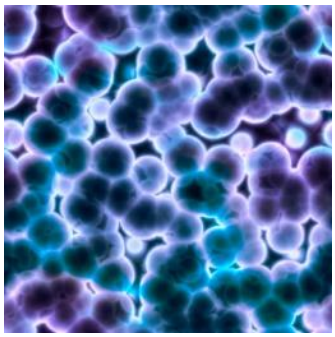
CUSTOMIZED AND SCALABLE THERAPY OF GENE APLOINS



Keywords

- RNA
- Enzymes
- Haploinsufficiency

Description

Development of the **NHMV platform**, for **RNA-dependent stimulation of gene transcription**: a new family of **RNA programmable artificial enzymes**, designed and developed in the **Laboratorio di Sviluppo della Corteccia Cerebrale of SISSA** (http://lccd.sissa.it/). They are 7 times smaller than the most famous CRISPR factors and differ from the latter due to the more moderate gene expression gain, limited to the physiological fluctuation range, as well as to the restriction of their activity to the already active genes. Thanks to these characteristics, they constitute an elective tool for the specific and scalable therapy of haploinsufficiency. After the publication of the initial version of the platform, the principles of the current year, experimental investigations are underway for its strengthening and refinement.

Applications

Haploinsufficiency is a genetic alteration underlying a large number of diseases, including many affecting the central nervous system. They are cumulatively fairly frequent and together constitute a market with great potential. However, their individual prevalence is low and the molecular consequences are extremely varied. This has made the development of targeted therapies so far difficult, due to the complexity of the problem and the particularly high investment / benefits ratio. NMHV enzymes have the right properties to cope with this impasse, making the problem attackable in a serial and scalable way.

Scientific Reference

Prof. Antonello Mallamaci

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GENE THERAPY FOR THE ERADICATION OF GLIOBLASTOMA

Keywords

- Glioblastoma
- EMX2 gene
- Tumor stem cells

Summary

Gene therapy by induction of EMX2 expression for the eradication of Glioblastoma (GBM), characterized by simultaneously targeting a remarkable number of **distinct metabolic nodes**, crucial for the malignancy of the same species in the most advanced stages of its progression (patent application IT 102015000046666).

Technology

The proposed experimental therapeutic treatment, patented in SISSA and developed by prof. Mallamaci consists of a gene therapy for the eradication of Glioblastoma (GBM), characterized by simultaneously targeting a remarkable number of distinct metabolic nodes, crucial for the malignancy of the same species in the most advanced stages of its progression. This explains the high frequency of response observed in the experimental studies conducted so far. In addition, **the therapeutic activity unfolds specifically in the tumor stem cells**, facilitating their eradication. The treatment arises from the enhancement of the results of the study of normal mechanisms of **regulation of cortico-cerebral astrogenesis** conducted at the **Laboratorio di Sviluppo della Corteccia Cerebrale of SISSA** (http://lccd.sissa.it/). It is based on the **controlled overexpression of the EMX2 gene**, implicated in the normal regulation of cerebral histogenesis, capable of inducing the collapse of all the currently tested glioblastomas, in vitro and in vivo.

Advantages

The proposed experimental therapy, compared to the others available today, allows to act simultaneously on a remarkable number of distinct metabolic nodes, among which many are crucial for the malignancy of the tumor in the most advanced stages of its progression. As such, it portends:

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- a high frequency of success with primary tumors of different molecular origins;
- a particular ability on the part of the treatment to counteract recurrences.

Reference market

Every year, the GBM afflicts 2000 new patients in Italy, 15,000 in the EU, over 200,000 in the whole world, with a survival time that does not exceed 15 months. From an economic point of view, the "global market" for the treatment of this family of tumors was quantified at US $ 659 million in 2014 and is estimated to triple by 2024 to reach US $ 3.3 billion (Source: GlobaData - 2014).

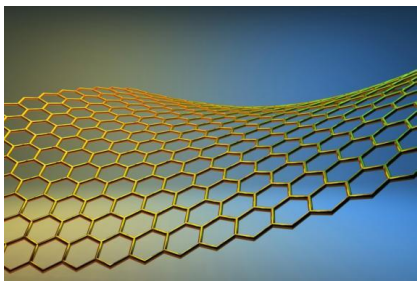
Technology readiness level

The therapy obtained very encouraging results in the in vitro experimentation already carried out and in the first in vivo experiments, on murine models (TRL 3/4).

Scientific referent

Prof. Antonello Mallamaci - Director of the Laboratorio di Sviluppo della Corteccia Cerebrale of SISSA

GRAPHENE BASED NANOMATERIALS FOR BIOMEDICH APPLICATIONS



Keywords

- Tissue implants /artificial tissue contructs
- Biosensoristics
- Eliminating use animals for drug
- Reducing time and costs

Description

Study of the biomedical applications of sensors in terms of interactions between them and the biological material in which they are placed in contact in order to enhance their

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interaction as much as possible. The result of this study is realized in tissue implants / Artificial tissue contructs having two types of advantages: a) ethical, eliminating the need to use animals for drug testing and therapies and b) reducing the time necessary to carry out such tests, resulting in therefore lower costs in the testing phases.

Applications

Biomedical Industry and in particular advanced biosensoristics in the first place. In particular, the industries (BigPharma, companies focused on the Biopharmaceutical Research & Development and Drug Discovery Processes business).

http://phdneurobiology.sissa.it/eng/faculty/laura-ballerini.aspx

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LOW COST TECHNIQUE OF SEQUENCING OF THE GENOME

Keywords

- DNA e RNA
- Numerical simulations
- Mesoscopic models
- Nanopore and nanochannel
- Forensics diagnostics and genetics

Description

Translocation of DNA and RNA through nanopores or solid state nanochannels. Numerical simulations and mesoscopic models.

Low-cost genome sequencing, by inference of secondary and tertiary RNA structures, and presence of any topologically complex nodes or structures. Possibility to use **numerical simulations and mesoscopic models** to suggest optimal **nanopore and nanochannel fabrication** parameters for **nucleic acid sequencing** or characterization of their geometric and topological complexity. For this technology the applications could be multiple, the most immediate could concern, for example, f**orensics diagnostics and genetics**.

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Advantages

Compared to similar techniques currently used for genome sequencing, costs are considerably reduced (**as reagents are eliminated**).

Scientific Reference

Prof. C. Micheletti

BIG DATA

ANALYSIS AND SIMULATION OF THE OPTICAL AND CHROMATIC PROPERTIES OF NATURAL DYES IN THE FOOD INDUSTRY

Keywords

- Natural vs Artificial dyes
- Food industry
- Numerical simulations

Know how

Know-how and skills in the field of **numerical simulation of the optical and chromatic properties of natural dyes** in solution with experimental measurements such as photoemission, photoabsorption, vibrational, and` with STM and HRTEM microscopies.

Applications

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Food industry (requiring the use of natural dyes).

For example, prof. Baroni is currently collaborating with an important American multinational for the detection of molecular dyes from the anthocyanin family, capable of replacing some artificial dyes currently used and suspected of being harmful to health, and in any case being eliminated from the trade due to of community law provisions.

Scientific Referent

Prof. Stefano Baroni

ADVANCED SCIENTIFIC CALCULATION TECHNIQUES APPLIED

Keywords

- High performace scientific computing
- Scienfic calculus

Know how

Advanced techniques and methods of **high performance scientific computing**; **reduced models** (reduced bases); **isogeometric analysis**; **finite element methods**, **finite spectral volumes**, **finite differences**; **parameterization** and **decomposition of calculation domains**.

Applications

The research concerning scientific computing, thanks to the decomposition of the calculation procedures (offline and online) allows to export the scientific calculation and the simulation in contexts and contexts in which this strand is not yet developed and widespread (eg small and medium enterprises , hospitals), reality often far from access to super-computers or clusters. **The export of scientific calculus in new contexts** (coupling high performance and reduced models) also allows to integrate mathematical and numerical models with experimental and statistical data, improving the reliability of the models and of the simulated results.

Scientific referent

Prof. Gianluigi Rozza and Prof. Luca Heltai

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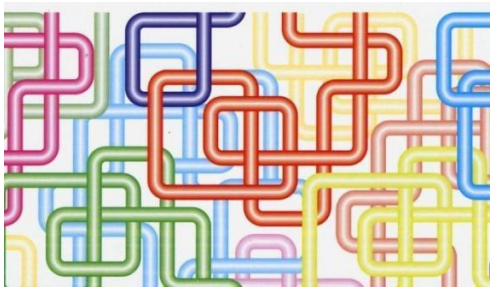
APPLIED MECHANICS



Keywords

- Continuum mechanics
- Structure mechanics
- Numerical fluid dynamics
- Heat transfer
- Electromagnetism

Technology

Development and application of numerical methods and advanced computational techniques in the fields of continuum mechanics (solids, gels, fluids, gases), **structure mechanics**, **numerical fluid dynamics**, **heat transfer**, **transport phenomena** and **electromagnetism**.
Applications
Aero-naval-mechanical field (production of raw materials, semi-finished products, finished products and construction), **robotics and hospital health** in the first place. In terms of immediate application advantages of these techniques and technologies, there are: process optimization, product optimization, resolution of complex problems, better understanding of the phenomena involved during the production and operating phases of the product, improvement of the quality of life of citizens (health hospitalization), pollution reduction, energy optimization.

Technology readiness level (TRL)
Actual system proven in operational environment (TRL 8/9)

Scientific referent
Prof. Antonio De Simone - SISSA Laboratory Director mathLab

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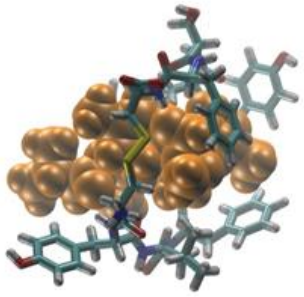
LOW COST PERSONALIZED PEPTIDE BINDERS FOR PROTEIN TARGETS



Keywords

- Peptides
- Personalized Proteins
- Peptides design

Description

Molecular recognition of protein targets is one of the most fundamental approaches in medicine and molecular biology for obtaining valuable analytical information. **Peptides as protein binders** have become a valid option in **the framework of protein recognition**, due to their numerous advantages, such as **the fast and low-cost synthesis**, or their high stability and versatility. However, the optimization of peptide sequences is usually performed by panning immune libraries, followed by punctual mutations to refine the binding affinity, an expensive and time consuming methodology. Moreover, these approaches do not allow for a control over their target binding site, therefore not allowing to fine-tune the bio-responsiveness of a device. The solution to these problems relies on the **computational design** which allow to address the forementioned drawbacks in the current approaches.

In silico design of peptides takes advantage of the growing computing power and the accuracy enhancement of binding affinity predictions to optimize from scratch peptides as binders of specific targets. Our developed **computational protocol** is capable to optimize the sequence and binding conformation of peptides that recognize with high affinity an a priori selected protein epitope.

Main Advantages

i) Fast and low-cost design;
ii) **Personalized peptides** designed specifically for the recognition of “difficult” protein systems;
iii) Personalized peptides can be also designed as **bioactive peptides** able to modify the enzymatic activity;

Collaboration offer

Joint activity in the peptide design and implementation (as well as its operational validation) for the recognition of a specific molecule proposed by the Industrial Partner, who will be entitled to negotiate an exclusive right of commercial exploitation of the final product.

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SISSA

Scuola Internazionale Superiore di Studi Avanzati

Scientific Director

Alessandro Laio, *Full Professor in the Statistical and Biological Physics sector at SISSA*, main research and scientific activity is focused on the development of techniques related to enhancing the capability of computer simulations to provide predictive answers for complex heterogeneous systems. Actually Alessandro is also the President of the *Centre Européen de Calcul Atomique et Moléculaire* (CECAM) in Lausanne, Switzerland.

MATHEMATICAL-FINANCIAL MODELS FOR "ASSET ALLOCATION OPTIMIZATION"

Keywords

- Financial Risk
- Asset allocation optimization
- Financial Mathematics

Technology

In financial mathematics, Markowitz's method is well known for optimizing the asset allocation, minimizing the risk with the same expected return. The limit of this approach lies in the fact that the risk is measured by the volatility of the portfolio which takes into account the stochastic process of the underlying assets only in Gaussian approximation. In reality, there are imported non-Gaussian effects, such as **skewness**, **kurtosis** and **fat tails** that require a generalization of the standard method. Instead, the conditional VAR or the expected shortfall is used as a risk measure. The methodology developed by prof. Reina allows **a more realistic treatment of the risk** and in fact the portfolios optimized in this way have a higher performance than those optimized with the standard method. The optimization procedures in question are more complex and require the intensive use of parallel computing and the resources currently available offered by High Performance Computing (HPC) for the purpose of containing the calculation times within reasonable limits. The method also incorporates the implementation of the Black-Litterman model in order to take into account the investor's forecasts regarding the future performance of the markets.

Applications

Financial mathematics and **asset allocation optimization**.

Scientific referent

Prof. Cesare Reina

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MECHANICAL DESIGN AND PRECISION MECHANICAL MICROSTRUCTURES

Keywords

- Mechanical experimental setups
- Precision mechanical microstructures
- Advanced mechanics and engineering
- Biomedical industry

Know how

The **Mechatronics laboratory** has a decade of experience in the development and **mechanical parametric design of experimental setups** and **precision mechanical microstructures**, boasting **advanced capabilities in synchronizing recording signals (sensors) and stimulation (actuators)**; The activity carried out in support of neuroscience research has allowed the development of high-performance **software and hardware ranging from simple monitoring systems to complex real-time embedded control systems**.

The laboratory has developed a development methodology able to offer the maximum customization of the measurement setup thanks to the integration of electronics, sensors, software and internally developed mechanical parts. Another characterizing expertise of the Laboratory is represented by **the advanced techniques of integration of optical fiber into micro-instrumentation**.

Application Areas

Advanced mechanics and engineering and **biomedical industry**.

More generally, the SISSA mechatronic laboratory is able to offer expertise and frontier technology mainly in the following areas:

- anywhere where **processes need to be measured and controlled**. Typical examples are the test benches that can have as object of analysis mechanical systems (evaluation of yields, resistance tests etc.), chemical, physical or energy processes etc .. The high degree of customization reachable both from the hardware and software side from the systems developed by the Laboratory they are a fundamental element for the quality of the measurement or test to be performed;
- in **integrated mechanics to control and automation systems and rapid precision prototyping through 3D printing and micromachining**, **microfluidics** (> 100µm);
- in **biomedical engineering**, probe prototyping and optical sensors.

Scientific referent

Prof. Mathew E. Diamond - Director of the SISSA Mechatronics Laboratory

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