Web Scraping science papers from site: bioRxiv on the topic - "Electroactive Polymers".

Electrochemical measurement of acetylcholine in the dorsolateral prefrontal cortex: A technical report

https://www.biorxiv.org/content/10.1101/120691v1

Ever since the discovery of acetylcholine in 1913, its role as neuromodulator has been extensively studied in a variety of model systems. These previous studies revealed that acetylcholine is of critical importance for several cognitive functions including attention, learning and memory. In spite of these previous findings, it has proven difficult to determine the amount of acetylcholine that is released during cognitive tasks with sub-second temporal resolution. One method that might be used to measure acetylcholine release is the use of an enzyme-coupled amperometric sensor, which has been suggested to measure acetylcholine with high sensitivity, selectivity and relatively high temporal resolution (< 1 second). In the present study, we have tried to adapt the technique developed in the rodent model system by Parikh and colleagues1,2 for use in non-human primates. We aimed to measure in-vivo levels of acetylcholine in the macaque dorsolateral prefrontal cortex while the monkey performed an attention demanding curve-tracing task3,4. We report that our attempts to measure acetylcholine using amperometry in an awake behaving macaque monkey proved difficult and tedious and that our results are inconsistent and prone to noise. In the discussion, we will outline the challenges that will need to be addressed to use this technique in non-human primates and hope that our observations inspire solutions to help future research on the role of this important neurotransmitter.

Extracellular electron uptake in Methanosarcinales is independent of multiheme c-type cytochromes

https://www.biorxiv.org/content/10.1101/747485v1

The co-occurrence of Geobacter and Methanosarcinales is often used as a proxy for the manifestation of direct interspecies electron transfer (DIET) in man-made and natural aquatic environments. We previously reported that not all Geobacter are capable of DIET with Methanosarcina. Here we tested 15 new artificial co-culture combinations with methanogens and electrogenic bacteria, including an electrogen outside of the Geobacter clade â€“ Rhodoferax ferrireducens.

Synthetic Biology - Mapping the Patent Landscape

https://www.biorxiv.org/content/10.1101/483826v1

This article presents the global patent landscape for synthetic biology as a new and emerging area of science and technology. The aim of the article is to provide an overview of the emergence of synthetic biology in the patent system and to contribute to future research by providing a high quality tagged core dataset with 7,424 first filings and 71,887 family members. This dataset is intended to assist with evidence based exploration of synthetic biology in the patent system and with advancing methods for the analysis of new and emerging areas of science and technology.

Polypyrrole increases branching and neurite extension by Neuro2A cells on PBAT ultrathin fibers

https://www.biorxiv.org/content/10.1101/241307v1

Graphical AbstractElectrospinning shows a feasible way to generate hybrid scaffolds from the combination of different materials. This work presented a successful route to prepare ultrathin fibers from hybrid solutions containing a commercial polyester, poly (butylene adipate-co-terephthalate) (PBAT) and a conductive polymer, polypyrrole (PPy). The final material (PBAT/PPy) showed an enhanced potential for neuronal differentiation when compared to neat PBAT. The PPy loading improved branching and neurite extension of Neuro2a cells, which opens a wide range of perspectives where these materials may be applied in regenerative medicine.

Studies in Particle Sorting by Paramecium Cilia Arrays

https://www.biorxiv.org/content/10.1101/109470v1

Motile cilia are cell-surface organelles whose purposes, in ciliated protists and certain ciliated vertebrate epithelia, include generating fluid flow, chemosensation, mechanosensation and substance uptake. Certain properties of cilia arrays, such as beating synchronisation and manipulation of external proximate particulate matter, are considered emergent, but remain incompletely characterised despite these phenomena having being the subject of extensive modelling. This study constitutes a laboratory experimental characterisation of one of the emergent properties of motile cilia; microparticle manipulation. The work demonstrates through automated videomicrographic particle tracking that interactions between microparticles and somatic cilia arrays of the ciliated model organism Paramecium caudatum constitute a form of rudimentary â€˜sortingâ€™. Small particles are drawn into the organismâ€™s proximity by cilia-induced fluid currents at all times, whereas larger particles may be held immobile at a distance from the cell

margin when the cell generates characteristic feeding currents in the surrounding media. These findings can contribute to the design and fabrication of biomimetic cilia, with potential applications to the study of ciliopathies.

Electrically induced bacterial membrane potential dynamics correspond to cellular proliferation capacity

https://www.biorxiv.org/content/10.1101/542746v1

Membrane-potential dynamics mediate bacterial electrical signaling at both intra- and inter- cellular levels. Membrane potential is also central to cellular proliferation. It is unclear whether the cellular response to external electrical stimuli is influenced by the cell proliferative capacity. A new strategy enabling electrical stimulation of bacteria with simultaneous monitoring of single-cell membrane potential dynamics would allow bridging this knowledge gap and further extend electrophysiological studies into the field of microbiology. Here we report that an identical electrical stimulus can cause opposite polarization dynamics depending on cellular proliferation capacity. This was demonstrated using two model organisms, namely B. subtilis and E. coli, and by developing an apparatus enabling exogenous electrical stimulation and single-cell time-lapse microscopy. Using this bespoke apparatus, we show that a 2.5 sec electrical stimulation causes hyperpolarization in unperturbed cells. Measurements of intracellular K+ and the deletion of the K+ channel suggested that the hyperpolarization response is caused by the K+ efflux through the channel. When cells are pre-exposed to UV-violet light, the same electrical stimulation depolarizes cells instead of causing hyperpolarization. A mathematical model extended from the FitzHugh-Nagumo neuron model suggested that the opposite response dynamics are due to the shift in resting membrane potential. As predicted by the model, electrical stimulation only induced depolarization when cells are treated with antibiotics, protonophore or alcohol. Therefore, electrically induced membrane potential dynamics offer a novel and reliable approach for rapid detection of proliferative bacteria and determination of their sensitivity to antimicrobial agents at the single-cell level.

Electrical Energy Storage with Engineered Biological Systems

https://www.biorxiv.org/content/10.1101/595231v1

The availability of renewable energy technologies is increasing dramatically across the globe thanks to their growing maturity. However, large scale electrical energy storage and retrieval will almost certainly be a required in order to raise the penetration of renewable sources into the grid. No

present energy storage technology has the perfect combination of high power and energy density, low financial and environmental cost, lack of site restrictions, long cycle and calendar lifespan, easy materials availability, and fast response time. Engineered electroactive microbes could address many of the limitations of current energy storage technologies by enabling rewired carbon fixation, a process that spatially separates reactions that are normally carried out together in a photosynthetic cell and replaces the least efficient with non-biological equivalents. If successful, this could allow storage of renewable electricity through electrochemical or enzymatic fixation of carbon dioxide and subsequent storage as carbon-based energy storage molecules including hydrocarbon and non-volatile polymers at high efficiency. In this article we compile performance data on biological and non-biological component choices for rewired carbon fixation systems and identify pressing research and engineering challenges.

Distinct cortical-amygdala projections drive reward value encoding and retrieval

https://www.biorxiv.org/content/10.1101/299958v2

The value of an anticipated rewarding event is crucial information in the decision to engage in its pursuit. The networks responsible for encoding and retrieving this value are largely unknown. Using glutamate biosensors and pharmacological manipulations, we found that basolateral amygdala (BLA) glutamatergic activity tracks and mediates both the encoding and retrieval of the state-dependent incentive value of a palatable food. Projection-specific and bidirectional chemogenetic and optogenetic manipulations revealed the orbitofrontal cortex (OFC) supports the BLA in these processes. Critically, the function of ventrolateral (lOFC) and medial (mOFC) OFCâ†'BLA projections was found to be doubly dissociable. Whereas activity in lOFCâ†'BLA projections is necessary for and sufficient to drive encoding of a positive change in the value of a reward, mOFCâ†'BLA projections are necessary and sufficient for retrieving this value from memory to guide its pursuit. These data reveal a new circuit for adaptive reward valuation and pursuit, indicate dissociability in the encoding and retrieval of reward memories, and provide insight into the dysfunction in these processes that characterizes myriad psychiatric diseases.

Genetic Control of Radical Crosslinking in a Semi-Synthetic Hydrogel

https://www.biorxiv.org/content/10.1101/752436v1

Enhancing materials with the qualities of living systems, including sensing, computation, and adaptation, is an important challenge in designing next-generation technologies. Living materials

seek to address this challenge by incorporating live cells as actuating components that control material function. For abiotic materials, this requires new methods that couple genetic and metabolic processes to material properties. Toward this goal, we demonstrate that extracellular electron transfer (EET) from Shewanella oneidensis can be leveraged to control radical crosslinking of a methacrylate-functionalized hyaluronic acid hydrogel. Crosslinking rates and hydrogel mechanics, specifically storage modulus, were dependent on a variety of chemical and biological factors, including S. oneidensis genotype. Bacteria remained viable and metabolically active in the crosslinked network for a least one week, while cell tracking revealed that EET genes also encode control over hydrogel microstructure. Moreover, construction of an inducible gene circuit allowed transcriptional control of storage modulus and crosslinking rate via the tailored expression of a key electron transfer protein, MtrC. Finally, we quantitatively modeled dependence of hydrogel stiffness on steady-state gene expression, and generalized this result by demonstrating the strong relationship between relative gene expression and material properties. This general mechanism for radical crosslinking provides a foundation for programming the form and function of synthetic materials through genetic control over extracellular electron transfer.

Rapid and highly sensitive detection of pyocyanin biomarker in different Pseudomonas aeruginosa infections using gold nanoparticles modified sensor

https://www.biorxiv.org/content/10.1101/616797v1

Successful antibiotic treatment of infections relies on accurate and rapid identification of the infectious agents. Pseudomonas aeruginosa is implicated in a wide range of human infections that almost complicated and become life threating especially in immunocompromised and critically ill patients. Conventional microbiological methods take more than 3 days to obtain accurate results. Pyocyanin is a distinctive electroactive biomarker for Pseudomonas aeruginosa. Here, we have developed a rapid diagnostic (polyaniline) PANI gold nanoparticles (Au NPs) modified indium tin oxide (ITO) electrode that showed 100% sensitivity for pyocyanin in culture of Pseudomonas aeruginosa clinical isolates and high selectivity for pyocyanin at low concentration when measured in the presence of other substances like ascorbic acid, uric acid, and glucose as interferences. The constructed electrode was characterized using scanning electron microscopy and cyclic voltammetry. The determined linear range for pyocyanin detection was from 238 ÂµM to 1.9 ÂµM with a detection limit of 500 nM. Compared to the screen-printed electrode used before, the constructed electrode showed a 4-fold enhanced performance.

Understanding the impact of crosslinked PCL/PEG/GelMA electrospun nanofibers on bactericidal activity

https://www.biorxiv.org/content/10.1101/322321v2

Herein, we report the design of electrospun ultrathin fibers based on polycaprolactone (PCL), polyethylene glycol (PEG), and gelatin methacryloyl (GelMA), and their potential bactericidal activity against three different bacteria Staphylococcus aureus, Pseudomonas aeruginosa, and Methicillin-resistant Staphylococcus aureus (MRSA). We evaluated the morphology, chemical structure and wettability before and after UV photocrosslinking of the produced scaffolds. Results showed that the developed scaffolds presented hydrophilic properties after PEG and GelMA incorporation. Our developed scaffolds were thus able to significantly reduce gram-positive, negative, and MRSA bacteria. Furthermore, we performed a series of study for better mechanistic understanding of the scaffolds bactericidal activity through protein adsorption study and analysis of the reactive oxygen species (ROS) levels. In summary, we have demonstrated the design and generation of electrospun fibers with improved hydrophilicity and efficient bactericidal activity without the association of any antibiotics.

Improving microbial electrosynthesis of polyhydroxybutyrate (PHB) from CO2 by Rhodopseudomonas palustris TIE-1 using an immobilized iron complex modified cathode

https://www.biorxiv.org/content/10.1101/214577v1

Microbial electrosynthesis (MES) is a promising bioelectrochemical approach to produce biochemicals. A previous study showed that Rhodopseudomonas palustris TIE-1 can directly use poised electrodes as electron donors for photoautotrophic growth at cathodic potentials that avoid electrolytic H2 production (photoelectroautotrophy). To make TIE-1 an effective biocatalyst for MES, we need to improve its electron uptake ability and growth under photoelectroautotrophic conditions. Because TIE-1 interacts with various forms of iron while using it as a source of electrons for photoautotrophy (photoferrotrophy), we tested the ability of iron-based redox mediators to enhance direct electron uptake. Our data show that soluble iron cannot act as a redox mediator for electron uptake by TIE-1 from a cathode poised at +100mV vs. Standard Hydrogen electrode. We then tested whether an immobilized iron-based redox mediator Prussian Blue (PB) can enhance electron uptake by TIE-1. Chronoamperometry indicates that cathodic current uptake by TIE-1 increased from 1.47 Â± 0.04 to 5.6 Â± 0.09 ÂµA/cm2 (3.8 times) and the production of the bioplastic, polyhydroxybutyrate (PHB) improved from 13.5 Â± 0.2 g/L to 18.8 Â± 0.5 g/L (1.4 times) on

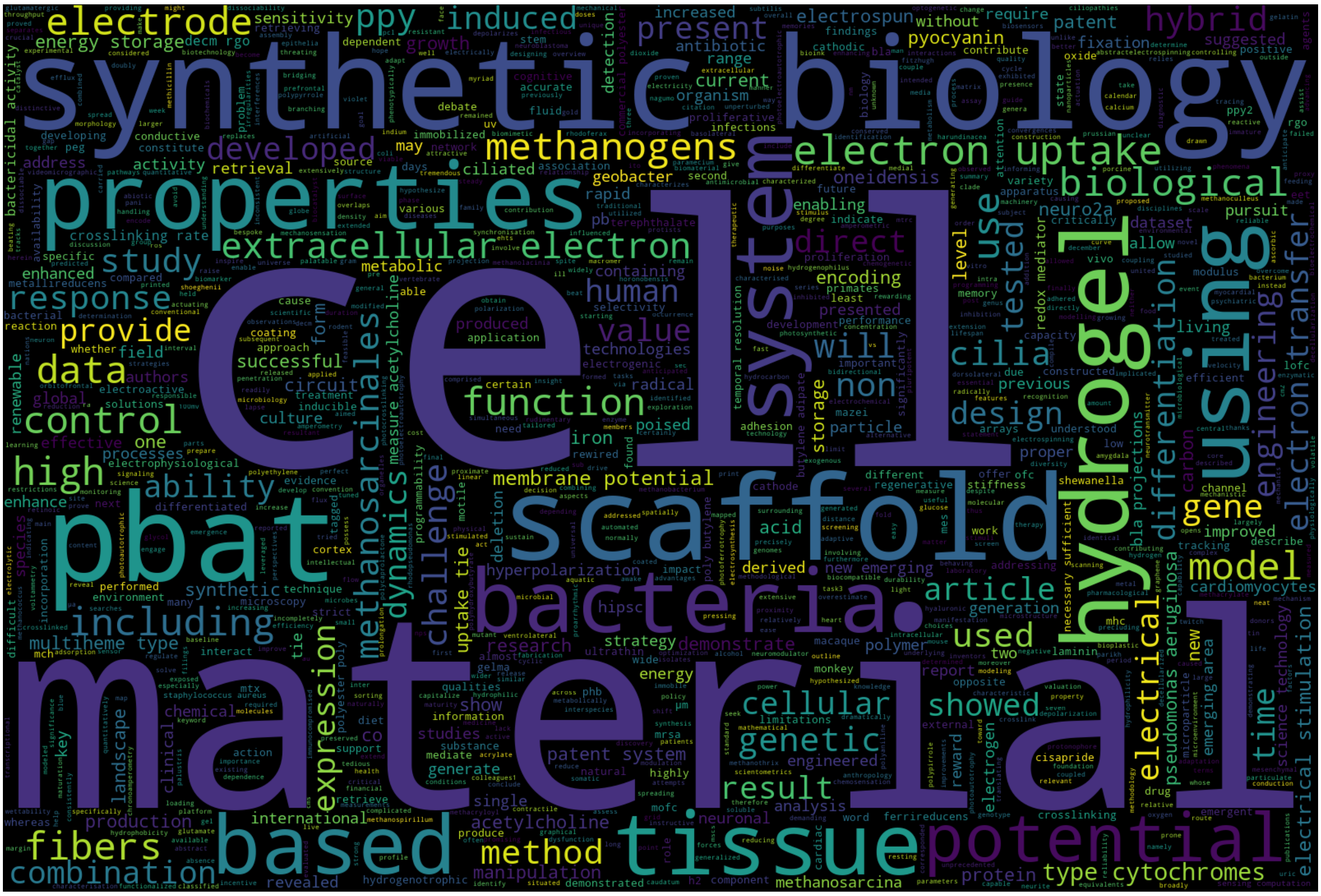
electrodes coated with PB. Overall, our data show that immobilized PB can increase direct electron uptake by TIE-1 and enhances PHB production.

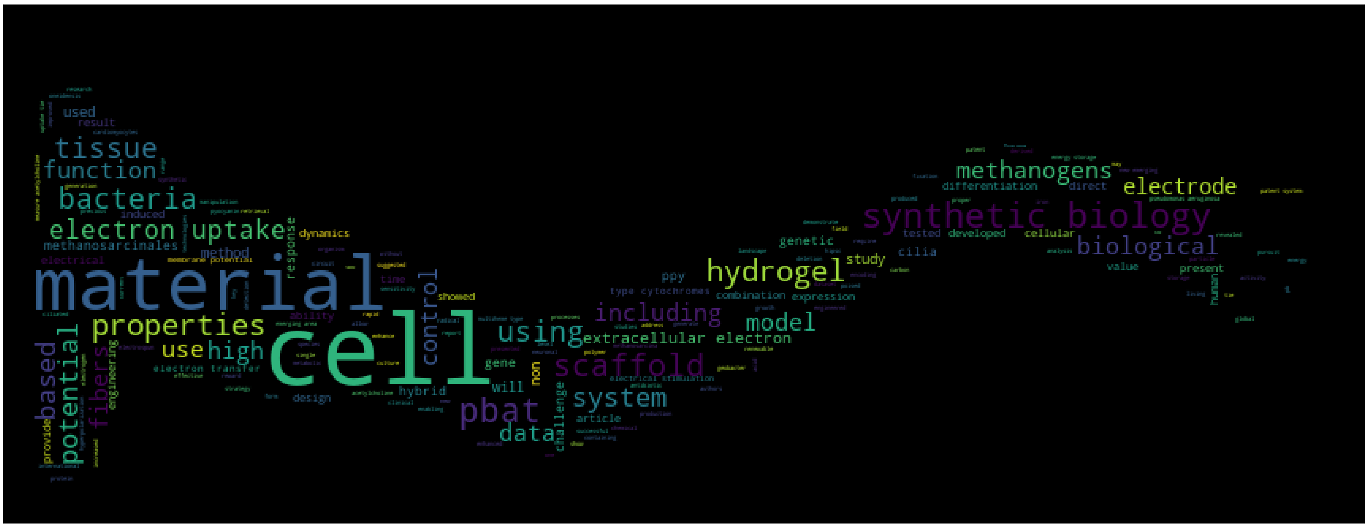
Functional Maturation of Human iPSC-based Cardiac Microphysiological Systems with Tunable Electroconductive Decellularized Extracellular Matrices

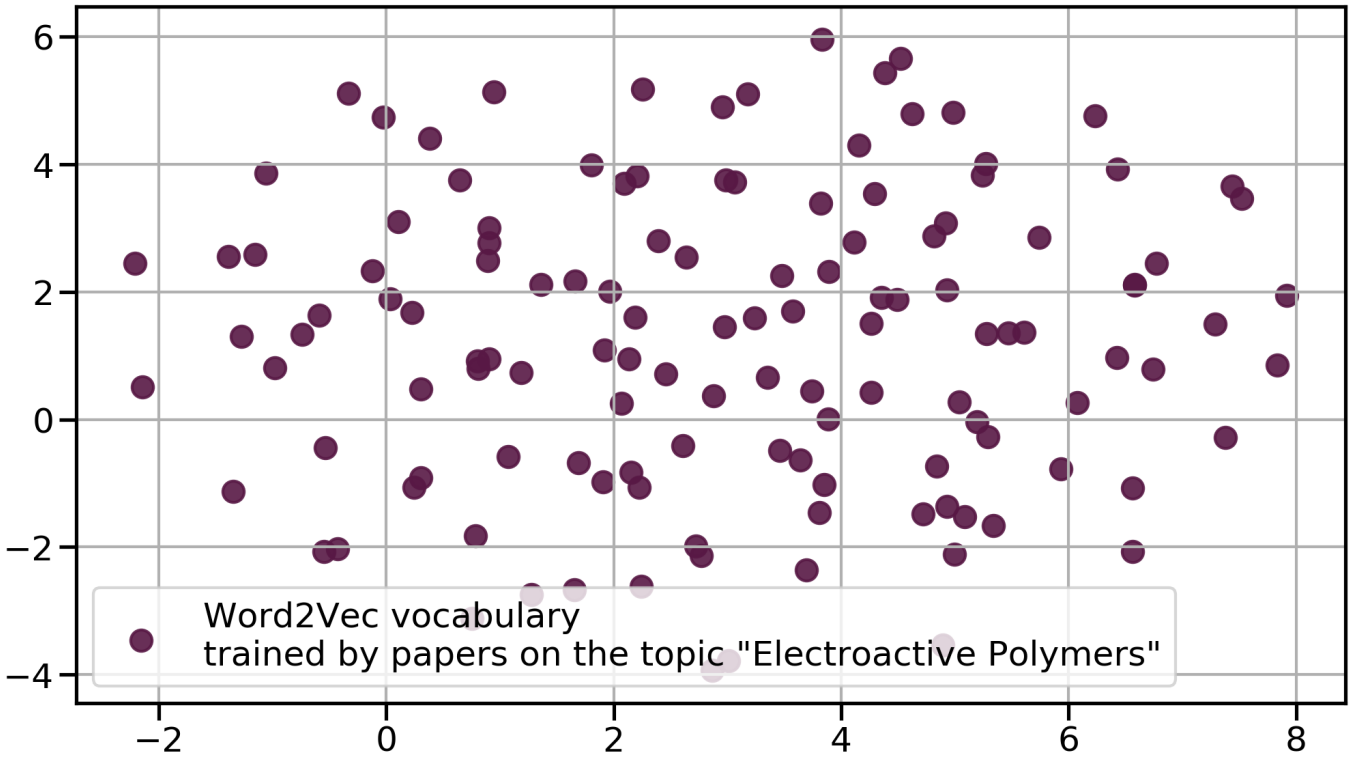
https://www.biorxiv.org/content/10.1101/786657v1

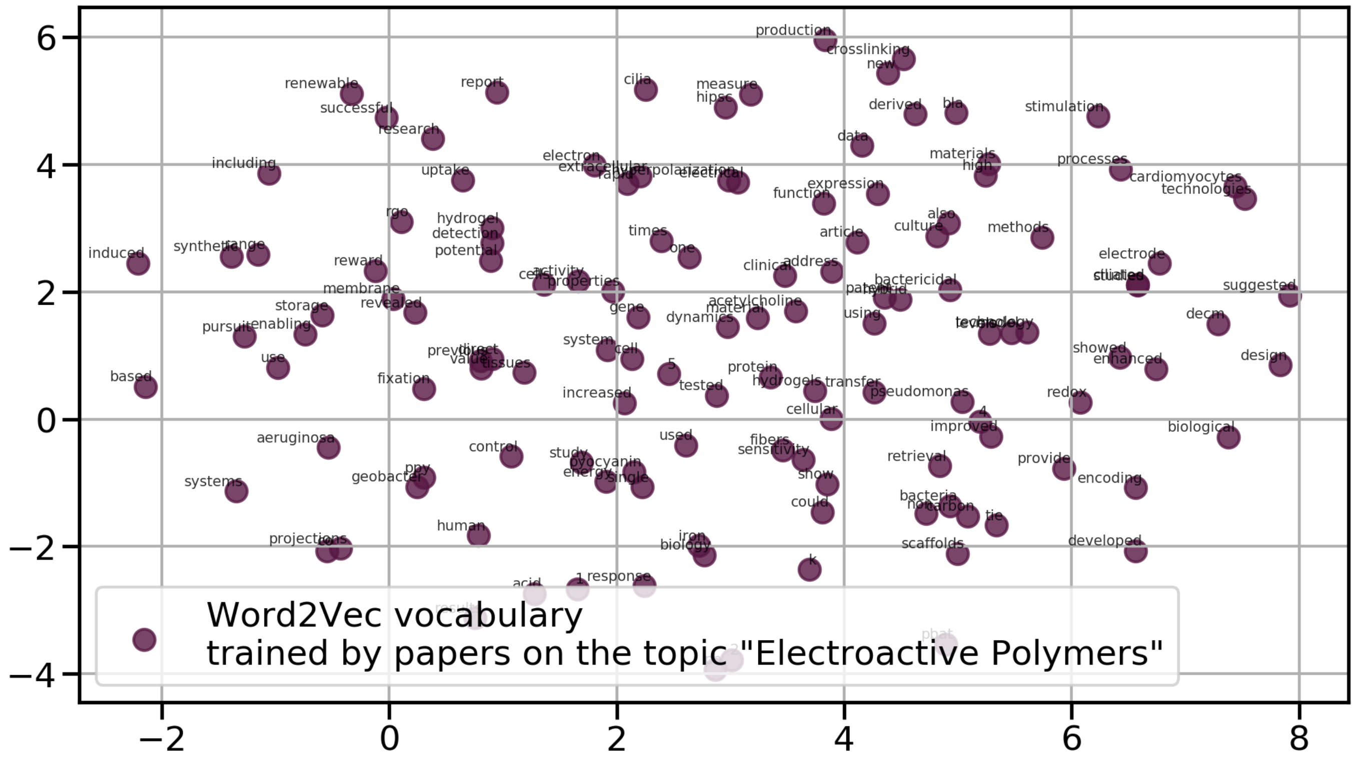
Human induced pluripotent stem cell-derived cardiomyocytes (hiPSC-CMs) offer tremendous potential for use in engineering human tissues for regenerative therapy and drug screening. However, differentiated cardiomyocytes are phenotypically immature, reducing assay reliability when translating in vitro results to clinical studies and precluding hiPSC-derived cardiac tissues from therapeutic use in vivo. To address this, we have developed hybrid hydrogels comprised of decellularized porcine myocardial extracellular matrix (dECM) and reduced graphene oxide (rGO) to provide a more instructive microenvironment for proper cellular and tissue development. A tissue-specific protein profile was preserved post-decellularization, and through the modulation of rGO content and degree of reduction, the mechanical and electrical properties of the hydrogels could be tuned. Engineered heart tissues (EHTs) generated using dECM-rGO hydrogel scaffolds and hiPSC-derived cardiomyocytes exhibited significantly increased twitch forces at 14 days of culture and had increased the expression of genes that regulate contractile function. Similar improvements in various aspects of electrophysiological function, such as calcium-handling, action potential duration, and conduction velocity, were also induced by the hybrid biomaterial. We also demonstrate that dECM-rGO hydrogels can be used as a bioink to print cardiac tissues in a high-throughput manner, and these tissues were utilized to assess the proarrhythmic potential of cisapride. Action potential prolongation and beat interval irregularities was observed in dECM-rGO tissues at clinical doses of cisapride, indicating that the enhanced maturation of these tissues corresponded well with a capability to produce physiologically relevant drug responses.

Top Words Cloud



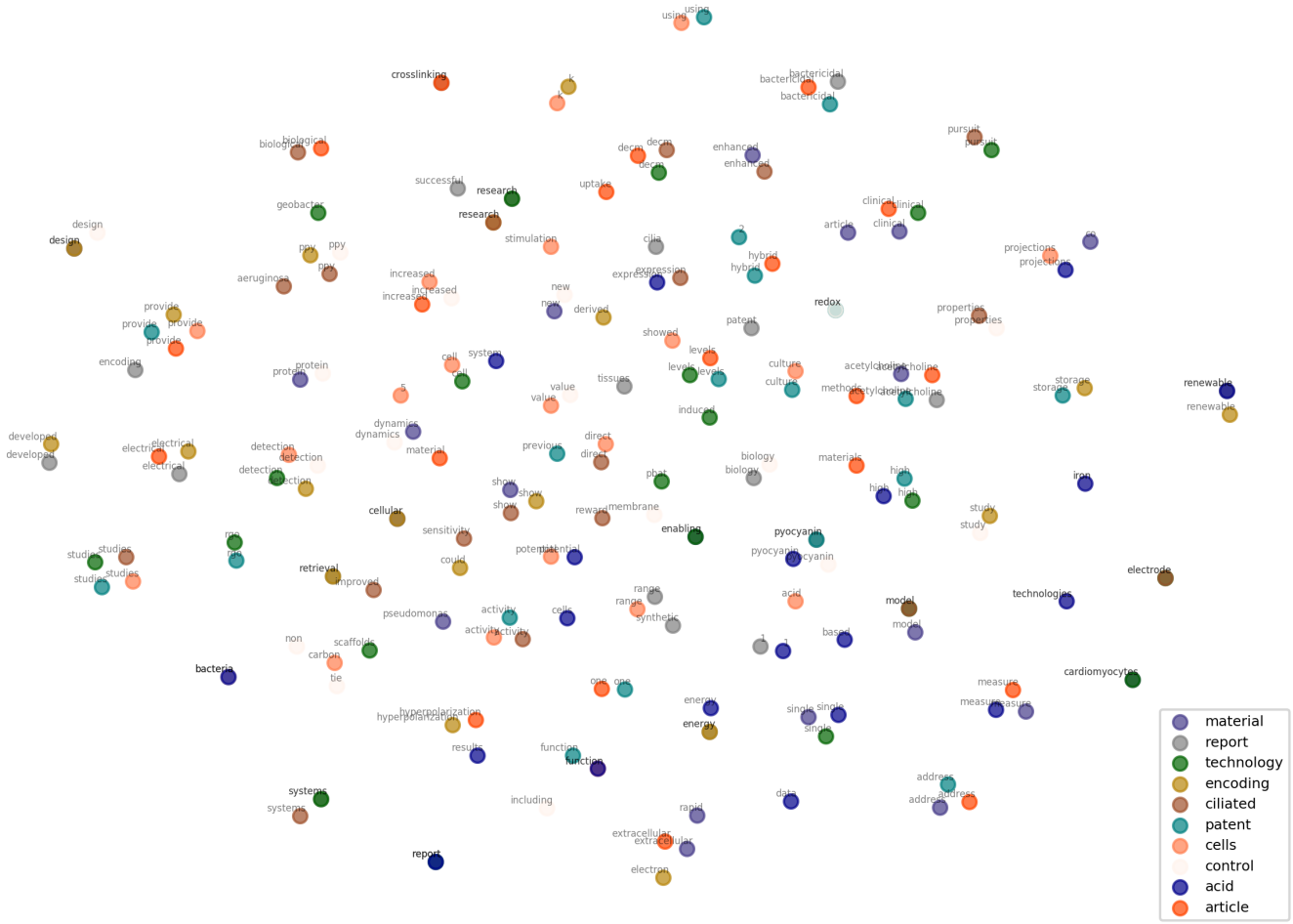

cell
material
synthetic biology
hydrogel
scaffold
pbat
tissue
function
bacteria
electron
uptake
properties
potential
based
fibers
use
high
control
using
system
data
including
model
extracellular electron
methanogens
electrode
biological
methanosarcinales
method
response
dynamics
used
result
induced
study
cilia
genetic
expression
combination
type cytochromes
ppy
article
hybrid
will
non
challenge
gene
design
showed
time
ability
electrical
provide
engineering
differentiation
direct
tested
developed
cellular
value
present
human
membrane potential
electron transfer
electrical stimulation


Word2Vec vocabulary
trained by papers on the topic "Electroactive Polymers"
6
4
2
0
−2
−4
−2
0
2
4
6
8

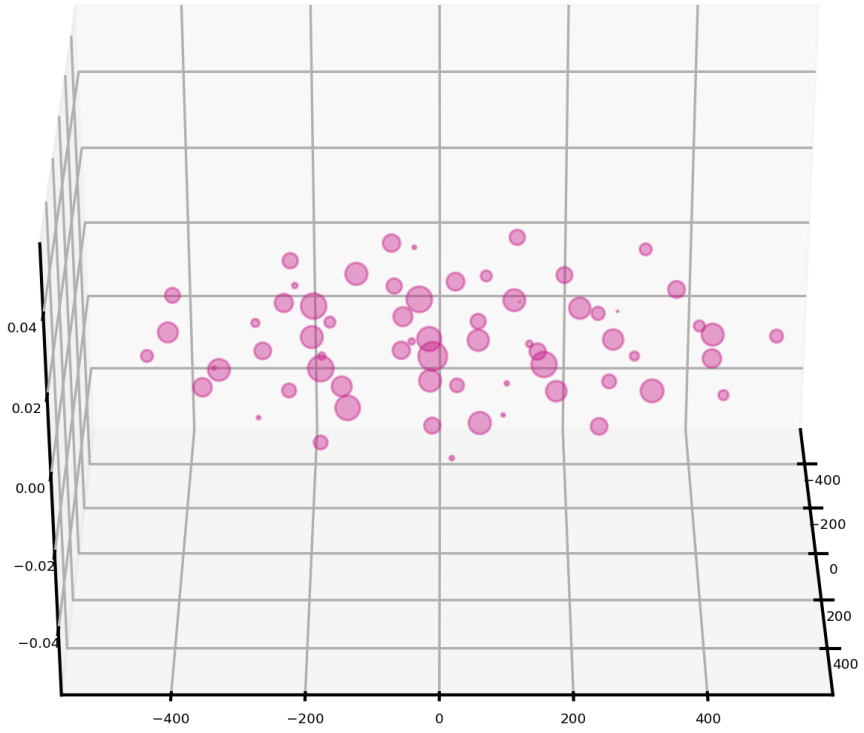


Word2Vec vocabulary
trained by papers on the topic "Electroactive Polymers"
6
4
2
0
−2
−4
−2
0
2
4
6
8
production
crosslinking
new
renewable
report
cilia
measure
hipsc
derived
bla
stimulation
successful
research
data
materials
high
processes
cardiomyocytes
technologies
including
uptake
electron
extracellular
rapid
hyperpolarization
electrical
expression
function
rgo
hydrogel
detection
potential
times
one
article
culture
also
methods
electrode
induced
synthetic
range
reward
clinical
address
cells
activity
properties
bactericidal
pathway
studied
suggested
membrane
revealed
storage
gene
acetylcholine
material
dynamics
using
technology
decm
pursuit
enabling
system
cell
showed
enhanced
design
use
previous
direct
value
tissues
5
protein
hydrogels
transfer
based
fixation
increased
tested
pseudomonas
redox
cellular
4
improved
biological
aeruginosa
used
fibers
sensitivity
control
study
pyocyanin
energy
single
retrieval
provide
systems
geobacter
ppy
show
encoding
could
bacteria
nocarbon
tie
human
projections
iron
biology
scaffolds
developed
k
acid
1
response

Similar words from Biorchiv on the topic "Electroactive Polymers"



Visualizing Word Embeddings using t-SNE



Papers from the "bioarchive.org" on the topic -"Electroactive Polymers"