Wireless Direct Microampere Current in Wound Healing: Clinical and Immunohistological Data from Two Single Case Reports

Chronic pressure ulcers are hard-to-heal wounds that decrease the patient's quality of life. Wireless Micro Current Stimulation (WMCS) is an innovative, non-invasive, similar to electrode-based electrostimulation (ES) technology, that generates and transfers ions that are negatively-charged to the injured tissue, using accessible air gases as a transfer medium. WMCS is capable of generating similar tissue potentials, as electrode-based ES, for injured tissue. Here, through immunohistochemistry, we intended to characterize the induced tissue healing biological mechanisms that occur during WMCS therapy. Two single cases of bedridden due to serious stroke white men with chronic non-healing pressure ulcers have been treated with WMCS technology. WMCS suppresses inflammatory responses by decreasing the aggregation of granulocytes, followed by stimulating myofibroblastic activity and a new formation of collagen fibers, as depicted by immunohistochemistry. As a result, WMCS provides a special adjunct or stand-alone therapy choice for chronic and non-healing injuries, similar to electrode-based ES, but with added (i.e., contactless) benefits towards its establishment as a routine clinical wound healing regime.

General information
Publication status: Published
Organisations: Department of Physics, University of Patras, Evaggelismos General Hospital
Corresponding author: Lagoumintzis, G.
Contributors: Lagoumintzis, G., Zagoriti, Z., Jensen, M. S., Argyrakos, T., Koutsojannis, C., Poulas, K.
Number of pages: 12
Publication date: 2019
Peer-reviewed: Yes

Publication information
Journal: Biosensors
Volume: 9
Issue number: 3
Article number: 107
ISSN (Print): 2079-6374
Ratings:
Web of Science (2019): Indexed yes
Original language: English
Keywords: Chronic wounds, Electrical stimulation, Direct microcurrent, Nin-invasive, Pressure ulcer, Wireless technology

Electronic versions:
Fulltext
DOIs:
10.3390/bios9030107
Source: FindIt
Source ID: 2453488194

Research output: Contribution to journal › Journal article – Annual report year: 2019 › Research › peer-review
A Higgs at 125.1 GeV and baryon mass spectra derived from a Common U(3) Lie group framework

Baryons are described by a Hamiltonian on an intrinsic U(3) Lie group configuration space with electroweak degrees of freedom originating in specific Bloch wave factors. By opening the Bloch degrees of freedom pairwise via a U(2) Higgs mechanism, the strong and electroweak energy scales become related to yield the Higgs mass 125.085±0.017 GeV and the usual gauge boson masses. From the same Hamiltonian we derive both the relative neutron to proton mass ratio and the N and Delta mass spectra. All compare rather well with the experimental values. We predict neutral flavour baryon singlets to be sought for in negative pions scattering on protons or in photoproduction on neutrons and in invariant mass like Σ^+(2455)D^- from various decays above the open charm threshold, e.g. at 4499, 4652 and 4723 MeV. The fundamental predictions are based on just one length scale and the fine structure coupling. The interpretation is to consider baryons as entire entities kinematically excited from laboratory space by three impact momentum generators, three rotation generators and three Runge-Lenz generators to internalize as nine degrees of freedom covering colour, spin and flavour. Quark and gluon fields come about when the intrinsic structure is projected back into laboratory space depending on which exterior derivative one is taking. With such derivatives on the measurescaled wavefunction, we derived approximate parton distribution functions for the u and d valence quarks of the proton that compare well with established experimental analysis.
Density functional theory based screening of ternary alkali-transition metal borohydrides: A computational material design project

We present a computational screening study of ternary metal borohydrides for reversible hydrogen storage based on density functional theory. We investigate the stability and decomposition of alloys containing 1 alkali metal atom, Li, Na, or K (M1); and 1 alkali, alkaline earth or 3d/4d transition metal atom (M2) plus two to five (BH4)− groups, i.e., M1M2(BH4)2–5, using a number of model structures with trigonal, tetrahedral, octahedral, and free coordination of the metal borohydride complexes. Of the over 700 investigated structures, about 20 were predicted to form potentially stable alloys with promising decomposition energies. The M1(Al/Mn/Fe)(BH4)4, (Li/Na)Zn(BH4)3, and (Na/K)(Ni/Co)(BH4)3 alloys are found to be the most promising, followed by selected M1(Nb/Rh)(BH4)4 alloys.
Atomar opbygning og det periodiske system

General information
Publication status: Published
Organisations: Department of Physics, Center for Nanoteknologi
Contributors: Jensen, M. O. S.
Publication date: 2008

Host publication information
Title of host publication: Materialebogen
Publisher: Nyt Teknisk Forlag
ISBN (Print): 978-87-571-2411-8
Source: orbit
Source ID: 211891
Research output: Chapter in Book/Report/Conference proceeding – Book chapter – Annual report year: 2008 – Education

Termodynamik og reaktionskinetik

General information
Publication status: Published
Organisations: Department of Physics, Center for Nanoteknologi
Contributors: Jensen, M. O. S.
Publication date: 2008

Host publication information
Title of host publication: Materialebogen
Publisher: Nyt Teknisk Forlag
ISBN (Print): 978-87-571-2411-8
Source: orbit
Source ID: 211892
Research output: Chapter in Book/Report/Conference proceeding – Book chapter – Annual report year: 2008 – Education

Transport af varme og stof

General information
Electrostatic tuning of permeation and selectivity in aquaporin water channels

Water permeation and electrostatic interactions between water and channel are investigated in the Escherichia coli glycerol uptake facilitator GlpF, a member of the aquaporin water channel family, by molecular dynamics simulations. A tetrameric model of the channel embedded in a 16:0/18:1c9-palmitolyloleylphosphatidylethanolamine membrane was used for the simulations. During the simulations, water molecules pass through the channel in single file. The movement of the single, ie water molecules through the channel is concerted, and we show that it can be described by a continuous-time random-walk model. The integrity of the single file remains intact during the permeation, indicating that a disrupted water chain is unlikely to be the mechanism of proton exclusion in aquaporins. Specific hydrogen bonds between permeating water and protein at the channel center (at two conserved Asp-Pro-Ala “NPA” motifs), together with the protein electrostatic fields enforce a bipolar water configuration inside the channel with dipole inversion at the NPA motifs. At the NPA motifs water-protein electrostatic interactions facilitate this inversion. Furthermore, water-water electrostatic interactions are in all regions inside the channel stronger than water-protein interactions, except near a conserved, positively charged Arg residue. We find that variations of the protein electrostatic field through the channel, owing to preserved structural features, completely explain the bipolar orientation of water. This orientation persists despite water translocation in single, ie and blocks proton transport. Furthermore, we find that for permeation of a cation, ion-protein electrostatic interactions are more unfavorable at the conserved NPA motifs than at the conserved Arg, suggesting that the major barrier against proton transport in aquaporins is faced at the NPA motifs.

General information
Publication status: Published
Organisations: Department of Physics
Contributors: Jensen, M. O. S., Tajkhorshid, E., Schulten, K.
Pages: 2884-2899
Publication date: 2003
Peer-reviewed: Yes