

Research of polymer based bio-sensors

PhD student introduction

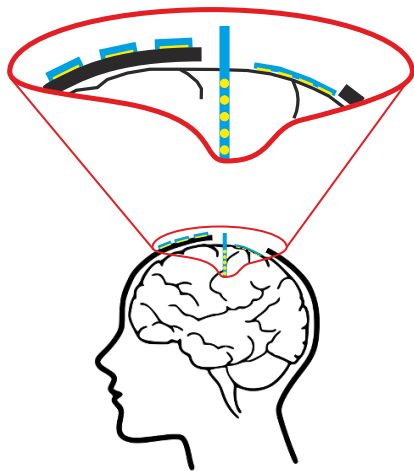
Gábor Orbán

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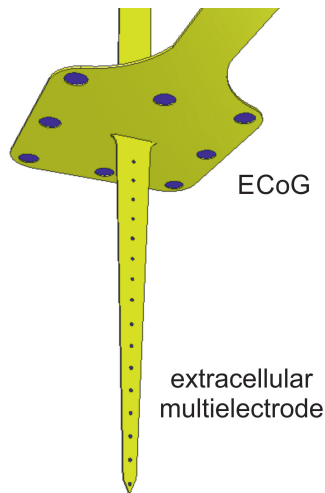
25 May 2017



- BUTE - electrical engineer
 - microelectronics
- Institute of Technical Physics and Materials Science, HAS
 - bioelectrical activity of brain
 - measuring options

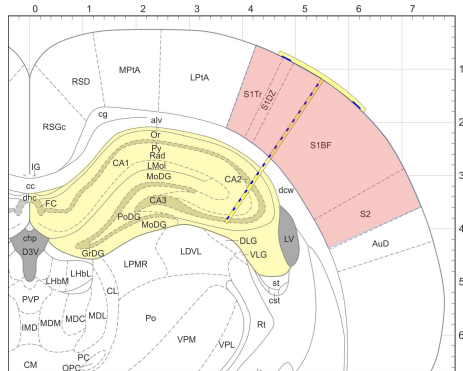


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 - design a polymer based microelectrode system



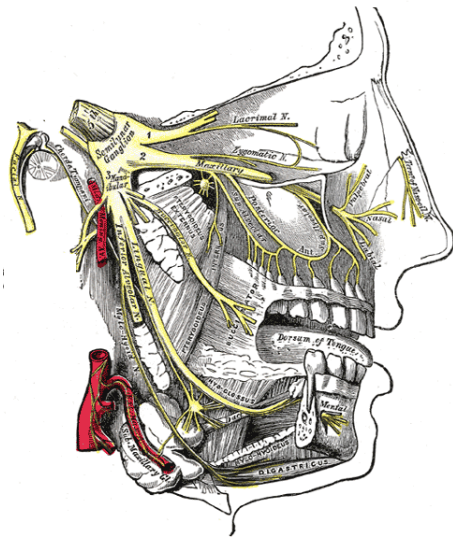
Educations - Bachelor degree

- BUTE - electrical engineer
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 - *in vivo* validation



Educations - Master degree

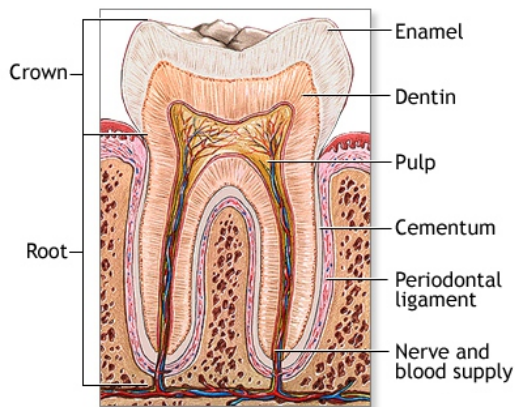
- BUTE - electrical engineer
 - smart system integration
- Institute of Cognitive Neuroscience and Psychology, RCNS, HAS
 - flexible electrode insertion method
- Department of Oral Diagnostics, FD, SE
 - dental research
 - polymer based electrode
 - bioelectrical activity
 - Nervus trigeminus



[Henry Gray: Anatomy of the Human Body, 1918]

From brain electrodes to a dental research

- Anatomy of the tooth
- Dentin recording
- Pain from tooth nerve
- Neuroplasticity



[www.budadent.hu, 2016]

Motivation and goals

Application of dentin recording

Measuring the dental nerve activity in high resolution on the dentin surface allows us to scan the inflammation process into the pulp because of the neuroplasticity.

- scan the process of the neuroplasticity
- localization of the source of the pain stimulus
- numerical method of toothache

Remaining Dentin Thickness

Measuring the impedance of the dentin in high resolution on the dentin surface allows us to calculate the remaining dentin thickness.

- develop an electrode system to measure:
 - remaining dentin thickness during a dental intervention
 - pulp vitality with measuring the dental nerve activities on the surface of dentin
 - dental pain because of the neuroplasticity
- *in vivo* validation of the electrode
- using the electrode to develop a tool for clinical applications

- A Multimodal, SU-8-Platinum - Polyimide Microelectrode Array for Chronic In Vivo Neurophysiology

PLOS ONE 10:(12) Paper e0145307. 16 p. (2015), Marton Gergely, Orban Gabor, Kiss Marcell, Fiath Richard, Pongracz Anita, Ulbert Istvan

- A polymer-based spiky microelectrode array for electrocorticography

MICROSYSTEM TECHNOLOGIES 21:(3) pp. 619-624. (2015), Gergely Márton, Marcell Kiss, Gábor Orbán, Anita Pongrácz, István Ulbert

- A Novel Polyimide – Platinum – SU-8 Microelectrode Array for Various Electrophysiological Applications

PROCEDIA ENGINEERING 87: pp. 380-383. (2014) Eurosensors 2014, Gergely Márton, Gábor Orbán, Marcell Kiss, Anita Pongrácz, István Ulbert

- MEMS érzékelők a neurofiziológiában

MTA Természettudományi Kutatóközpont Doktori Konferencia, Budapest, 2014. pp. 56-57. (ISBN:978-963-7067-28-0), Márton Gergely, Orbán Gábor, Fiáth Richárd, Bakos István, Fekete Zoltán, Pongrácz Anita, Ulbert István