“Dielectric elastomer sensors for digital healtcare”

Dielectric elastomer transducers (DET) exhibit a strain-stress behavior comparable to human tissues. Their efficiency to convert electrical energy into mechanical one is outstanding, e.g. as “artificial muscles” or “artificial skin” they are established in soft robotics. The use for medical implants, however, requires a reduction of the operation voltage by at least two orders of magnitude. Currently, a *Bridge-Proof of Concept* project, lead by Dr. Tino Töpper at the *Biomaterials Science Center*, focuses on the sensing capability of the DETs, fabricated by electro-spray deposition. Finally, these highly flexible sensors will serve as force-feedback sensor directly integrated on medical implants as “artificial skin”. Fabricated as multi-layer sensors they will remain operational even if one or the other layer fails due to breakdowns. The first prototype has been successfully designed and presented at the SPIE-Smart Materials meeting, Denver, U.S., march 2018,
see video: https://tube.switch.ch/videos/95778e8c
Currently, a pressure-sensitive intraoral splint with wireless communication is developed. The smart splint enables early diagnosis, AND the low-cost and individualized oral motor training – “tongue jogging”. The idea relates to the outstanding haptic capabilities of the tongue comparable to that of your hands. Microelectronics are developed by our partner at EMPA Dübendorf, D. Bachmann. The Bluetooth communication will be developed by computer science students to visualize the pressure date on Android devices.

Project information

The project and research facility is placed within a highly interdisciplinary environment of chemists, physicists, computer scientists and engineers.
Your tasks will include the (i) fabrication of gold/silicone nanostructures by electro-spray deposition as well as (ii) the molding of sensor foils, (iii) their characterization especially, morphology by atomic force microscopy and their electrical properties incldunig four-point and dynamic capacitance measurements.
The output of your work is intended to result into a conference contribution at the SPIE-Smart Materials meeting, March 2019.
The timeframe of includes master as well as project thesis for six and three month experimental lab work.

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