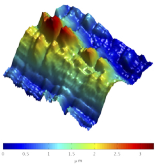
Driving Ephys the Smart Way – Latest Advances in Electrochemical and Electrophysiological Applications

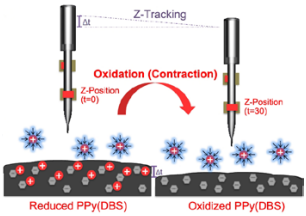
Biophysical Society 2018

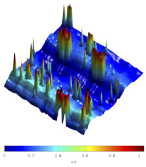
Satellite Event

Sunday, February 18, 2018
6:30 pm - 7:30 pm
Room: 6



Surface Topography





Measured Current

Smart Ephys

HEKA
a division of Harvard Bioscience, Inc.

Booth #535

Event is not sponsored by BPS.

Program

Surface Tracked Scanning Electrochemical Imaging – An approach to reduce imaging time

Dr. Vishnu Baba Sundaresan

Mechanical and Aerospace Engineering Department at Ohio State University, USA

Scanning electrochemical microscopy (SECM) has become a de facto standard for imaging electrochemical reactions occurring at a solid-electrolyte interface. Traditional SECM is limited by topographical bias, and various modalities have been proposed to overcome this limitation. One such method, referred to as shear-force (SF) imaging uses a closed-loop feedback control to precisely position a glass ultra-microelectrode (UME) over a substrate for characterizing its topography. We present an imaging technique based on using HEKA ElProScan SECM, where the SF is continuously tracked by the position controller while translating the UME over the surface to follow the underlying topography. We refer to this technique as `surface-tracked scanning electrochemical microscopy (ST-SECM)', and demonstrate spatio-temporal imaging of a conducting polymer with resolution previously unattainable by traditional scanning probe techniques. The conducting polymer used in this demonstration is analogous to a biological tissue based on it its mechanical properties and hence serves as a surrogate for demonstrating this imaging technique. It is anticipated that the proposed technique would enhance the understanding of the various electrochemical processes in cell biology, electrodes for energy storage, and corrosion science.

Speaker

Dr. Vishnu Baba Sundaresan

Dr. Sundaresan's research focus has been set on ionic (chemoelectrical/chemomechanical) materials and integrated material systems in sensing, actuation and energy storage. In the last several years his research group has been exploring multi-domain interactions in electroactive polymers, biomolecules and smart materials and developing multi-material constructs integrated at their fundamental scales of interaction. Dr. Sundaresan has received funding from various agencies and sponsors (such as NSF, NASA, Honda R&D Americas, Ford Motor Company, and a few others). In particular, Dr. Sundaresan and HEKA Elektronik GmbH worked collaboratively in a joint R&D project (2015-2016), in which HEKA's ElProscan SECM/SICM system was applied in studying Mechanoelectrochemistry of soft conducting polymers by the innovative "Nanoscale Shear-force-based Surface Tracking" technique (aka. Surface-Tracked SECM).

Notes

Notes