

Electrical Cell Biology Workshop

28/29 March 2019

University of Warwick, Coventry, UK



The theoretical and experimental inquiry within biological sciences has never fully embraced an electrical viewpoint. While important studies of bioelectrical processes have and are being conducted, such as the Nobel-winning chemiosmotic mechanism of energy generation on membranes and the chemical basis of neuronal electrical processes, these are commonly considered as confined processes not relating to other cellular functions or being specific to certain cell types only (e.g. neurons). Fragmented individual studies on a diverse range of biological systems, conducted over the last decade, however, show that electrical forces and electrochemical gradients are fundamental in maintaining all kinds of cellular functions and organising them across space/time.

We are at an exciting nexus, to develop a new theoretical and experimental framework that links electrical forces to the cell biological mechanisms that generate, sense, and use them. The goal of this international workshop is to facilitate this process through interdisciplinary scientific exchange.

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PRELIMINARY PROGRAMME

28 March 2018:

9:30 – 10:20 Registration
10:20 – 10:30 Introduction and workshop motivation (O. Soyer)

10:30 – 12:00 **Session 1**

25min PPT18 – Shelley Minter (U of Utah), '*Mechanisms of Extracellular Electron Transfer: From Methods of Evaluation to Materials for Promotion*'

5min Questions and changeover

25min PPT19 – Pat Unwin (U of Warwick), '*Lab-on-a-Tip: Multifunctional Nanoscale Electrochemical Probes for Single Cell Measurements*'

5min Questions and changeover

25min PPT20 – Minsu Kim (Emory) '*Tight regulation of electrically-charged substrate transport*'

5min Questions and changeover

12:00 – 13:30 **Lunch**

13:30 – 15:00 Session 2

25min PPT1 – Joff Silberg (Rice University), '*Using synthetic protein electron carriers to control bacterial metabolism*'

5min Questions and changeover

25min PPT2 – Mustafa Djamgoz (Imperial College) '*Bioelectricity of cancer*'

5min Questions and changeover

25min PPT3 - Roland Knorr (Max Planck), '*Membranes in electric fields*'

5min Questions and changeover

15:00 – 15:30 Coffee

15:30 – 17:00 Session 3

25min PPT4 – Robert Bradley (Imperial College), '*Engineering electroactivity for signalling, energy, and electrosynthesis*'

5min Questions and changeover

25min PPT5 – Munehiro Asally (U of Warwick), '*Electrically induced bacterial membrane potential dynamics*'

5min Questions and changeover

25min PPT6 – Arthur Prindle (Northwestern), '*Emergent metabolic dynamics in microbial communities*'

5min Questions and changeover

17:00 – 18:00 Coffee and Open discussion

18:00 – 19:00 Poster Session and Drinks

19:00 – Late Dinner

29 March 2019:

9:30 – 11:00 Session 4

25min PPT10 – Teuta Pilizota (U of Edinburgh), '*Single-cell bacterial electrophysiology*'

5min Questions and changeover

25min PPT11 –

5min Questions and changeover

25min PPT12 – Sonia Antoranz Contera (U of Oxford), '*Electromechanical coupling in neurons, collagen and the extracellular matrix*'

5min Questions and changeover

11:00 – 11:30 Coffee

11:30 – 13:00 Session 5

25min PPT13 – Orkun Soyer (U of Warwick), '*Understanding metabolism as an electrical process*'

5min Questions and changeover

25min PPT14 – Matthias Heinemann (U of Groningen), '*An upper limit on Gibbs energy dissipation governs cellular metabolism*'

5min Questions and changeover

25min PPT15 – selected talk.

5min Questions and changeover

13:00 – 14:00 Lunch

14:00 – 15:30 Session 6

25min PPT10 – Murray Grant (U of Warwick), '*Do variation potentials underpin systemic plant immunity*'

5min Questions and changeover

25min PPT11 – Giovanni Sena (Imperial College), '*Feel the force: root electrotopism in Arabidopsis*'

5min Questions and changeover

25min PPT12 – selected talk.

5min Questions and changeover

15:30 – 17:00 Coffee/Cake and Open discussion