1st VIRTUAL ISMET MEETING

ABSTRACT BOOK

ISMET

7-9th October 2021

WELCOME

Welcome to the 1st Virtual ISMET Meeting, an online space convening researchers in microbial electrochemistry and technology. The aim of this three-day occasion is to contemplate recent findings across the continuum of our field; from fundamental investigations into the nature of extracellular electron transfer, to the design and operation of bioelectrochemical systems.

Adapted for the digital arena, the general structure of oral and poster presentations will remain familiar to many. On the third day, the Discovery Award for Best Scientific Paper and the Innovation Award for Best Technological Advancement will be announced, in addition to our new ISMET board members.

Thank you for joining us in the first virtual global conversation of this scale for our community.

The Organizing Committee

Catarina, Fernanda and Lucinda

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ORGANIZING COMMITTEE

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POSTER PRESENTERS

1. **ANTHONY ABEL**, University of California, USA
   "Bioelectrochemical engineering analysis of formate-mediated microbial electrosynthesis"

2. **ABDELRAHMAN AMER**, McMaster University, CANADA
   "Lead reducing microbes isolated from bioelectrochemical systems"

3. **SUMAN BAJRACHARYA**, Luleå University of Technology, SWEDEN
   "Abiotic and biotic surface modification of cathode to enhance microbial electrosynthesis from CO_2"

4. **DOUGLAS F. CALL**, North Carolina State University, USA
   "Electrically driving exoelectrogenic nitrogen gas fixation"

5. **ALBA CEBALLOS-ESCALERA**, University of Girona, SPAIN
   "Simultaneous treatment of nitrate and arsenite polluted groundwater using a bioelectrochemical reactor"

6. **MIRIAM CERRILO,** Institute of Agrifood Research and Technology, SPAIN
   "Microbial electrolysis cell-anaerobic digestion combined system: a biorefinery for ammonia and energy recovery from livestock manure"

7. **ANAÍSA COELHO**, Universidade Nova de Lisboa, PORTUGAL
   "CymA, the supreme electron hub: decifering functional plasticity of *Shewanella*"

8. **SANNE M. DE SMIT**, Wageningen University and Research, THE NETHERLANDS
   "The invasive effects of cyclic voltammetry on microbial electrosynthesis"

9. **PAOLO DESSÌ**, National University of Ireland Galway, IRELAND
   "Hybiosol: hybrid bio-solar cells for CO_2 valorisation and wastewater treatment"

10. **JOERG S. DEUTZMANN**, Stanford University, USA
    "Microbial physiology during efficient and stable power-to-gas electromethanogenesis"

11. **GENE DRENDEL**, La Trobe University, AUSTRALIA
    "Working with what you have: adding resources is more effective at altering soil community functions than adding taxa"

12. **MARGO ELZINGA**, Wageningen University and Wetsus, THE NETHERLANDS
    "Microbial thiol reduction at cathodes in bioelectrochemical systems"

13. **MARIA O. FIRMINO**, Universidade Nova de Lisboa, PORTUGAL
"Unraveling *c*-type cytochromes' maturation system"

14. **HUI GUO**, McMaster University, CANADA
"Multi-electrode stack modulation for microbial electrolysis cell design"

15. **STEVEN G. HART**, Arizona State University, USA
"The pH indicator C-SNARF-4 does not accurately report pH gradients in *Geobacter sulfurreducens anode biofilms"*

16. **JACOB M. HILZINGER**, University of California, USA
"Systems analysis and prospects for high-rate microbial electrosynthesis driven by direct electron uptake"

17. **ETHAN HOWLEY**, Arizona State University, USA
"Characterizing performance of a commercial MFC fed simulated blackwater"

19. **CHRISTINE LEWIS**, Arizona State University, USA
"Unlocking efficiency: dynamic electro-molecular investigations of photosynthetic energy flow with microbial electro photosynthetic system"

20. **JUAN M. ORTIZ**, IMDEA Water Institute, SPAIN
"Microbial desalination for low energy drinking water: pilot plant operation and desalination performance analysis"

21. **HELEEN T. OUBOTER**, Radboud University, THE NETHERLANDS
"Methane oxidation by '*Candidatus methanoperedens*' at a bioanode reveals extracellular electron transfer"

22. **JO PHILIPS**, Aarhus University, DENMARK
"Can acetogenic bacteria thermodynamically favor cathodic H_2 generation?"

23. **GIULIA PUGGIONI**, University of Cagliari, ITALY and University of Girona, SPAIN
"Simultaneous denitrification and desalination of groundwater in 3-chamber BES configuration."

24. **MARINA RAMÍREZ-MORENO**, Universidad de Alcalá, SPAIN
"Comparative performance of microbial desalination cells using air diffusion and liquid cathode reactions: study of the salt removal and desalination efficiency"

25. **MERITXELL ROMANS-CASAS**, University of Girona, SPAIN
"Bio-electro CO_2 recycling to medium chain carboxylic acids in two steps"

26. **LAURA ROVIRA-ALSINA**, University of Girona, SPAIN
" Thermophilic bio-electro CO_2 recycling harnessing renewable energy surplus"

27. **CARLO SANTORO**, The University of Manchester, UK
"Synthesis steps affect the surface chemistry and the performance of Fe-based cathode catalysts for microbial fuel cells applications"

28. **ANA V. SILVA**, Universidade Nova de Lisboa, PORTUGAL
"Unravelling the effects of the *bol*A gene in current generation by *Shewanella oneidensis* MR-1"

29. **IMOLOGIE SIMEON**, Universität Bayreuth, GERMANY and Federal University of Technology, NIGERIA
"Influence of electrodes spacing on the maximum power of a soil microbial fuel cell based on stainless-steel-nanocarbon composite electrodes"

30. **RICARDO M. SOARES**, Universidade Nova de Lisboa, PORTUGAL
"Insights into the origin and evolution of the cell surface terminal reductase OcwA from *Thermincola potens* JR"

31. **MIRA SULONEN**, University of Surrey, UK
"The potential of indigenous microbial communities for greener bioelectroremediation of contaminated waters"

32. **IGNACIO VARGAS**, Pontificia Universidad Católica de Chile, Centro de Desarrollo Urbano Sustentable, Marine Energy Research & Innovation Center, CHILE
"Boosting denitrification in seawater: Electrochemical enrichment of marine denitrifying bacteria"

33. **RAMYA VEERUBHOTLA**, Indian Institute of Technology Kharagpur, INDIA
"Harnessing the power from paper-based microbial fuel cells to drive wireless sensor networks"

34. **G. VELVIZHI**, Vellore Institute of Technology, INDIA
"Extracellular electron transfer influences the recovery of metal in bioelectrochemical systems: analysis of overpotential electron losses"

35. **KRISHNAVENI VENKIDUSAMY**, Curtin University, AUSTRALIA
"Extracellular electron uptake by *Shewanella chilikensis* DC57 and its relevance to electrical microbial influenced corrosion"

36. **YUXUAN WAN**, Nankai University, CHINA
"Bioelectrochemical ammoniation (BEA) coupled with microbial electrolysis for nitrogen recovery from nitrate in wastewater"

INFLUENCE OF ELECTODES SPACING ON THE MAXIMUM POWER OF A SOIL MICROBIAL FUEL CELL BASED ON STAINLESS-STEEL-NANOCARBON COMPOSITE ELECTRODES

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Abstract: The electrical performance of microbial fuel cells (MFCs) is unstable due to the natural activities of the electroactive bacteria involved. To sustain the maximum performance of MFCs, an optimization of the architectural aspect is necessary with special consideration of electrode materials, electrode spacing and substrate availability. This study was conducted with three single-chamber soil MFCs having different electrode spacings (2, 5 and 8 cm) and electrodes made of stainless-steel mesh with activated carbon catalyst layers to investigate the influence of the electrode spacings on the sustainability of the Maximum Power Point (MPP) of a soil MFC with synthetic urine medium (SUM) as substrate. The MFCs using mud from active soil were polarized every three days until the MPP was reached and then refueled with SUM every 6 days during a 90-day operating period. During the initial treatments, the maximum power was inversely proportional to the anode-cathode distance. However, this trend could not be maintained during continuous treatments, as the optimum performance was achieved with an electrode spacing of 5 cm. At 2 cm, 5 cm and 8 cm electrode spacing, the maximum power and the open-circuit voltage were 695.67 ± 36.0041 µW and 779.71 ±13.698 mV for 18 days, 517.66 ± 30.4 µW and 804.8 ±12.01 mV for 66 days and 474.9 ± 45.3 µW and 757.49 ±11.488 mV for 54 days respectively. During continuous treatment, the internal resistances of the MFCs decreased by 34.30, 28.2 and 41.87 % respectively due to an increase in electrolyte conductivity. Electrochemical impedance spectroscopy of the MFCs showed that the treatment had a more significant effect on electrolyte resistance than charge transfer resistance. These results showed that optimal cathode-anode spacing ensures substrate availability at the electrodes to maintain bacterial metabolism, resulting in stable performance of an MFC over a reasonably long period of time.