

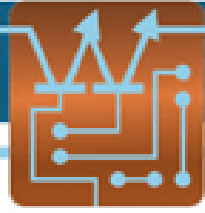
WEARPLEX Beta Workshop: Screen Printed OECT-based Logic Circuits



Peter Andersson Ersman, Yusuf Mulla, Lars Herlogsson, Kathrin Hübscher, Jan Strandberg

RISE Research Institutes of Sweden, Sweden

24th March 2021



Introduction

Organic electrochemical transistors (OECT)

Low-voltage operation (~1 V)

High current throughput

Scalable manufacturing, e.g. screen printing

Flexible substrates (plastic, paper, textile)

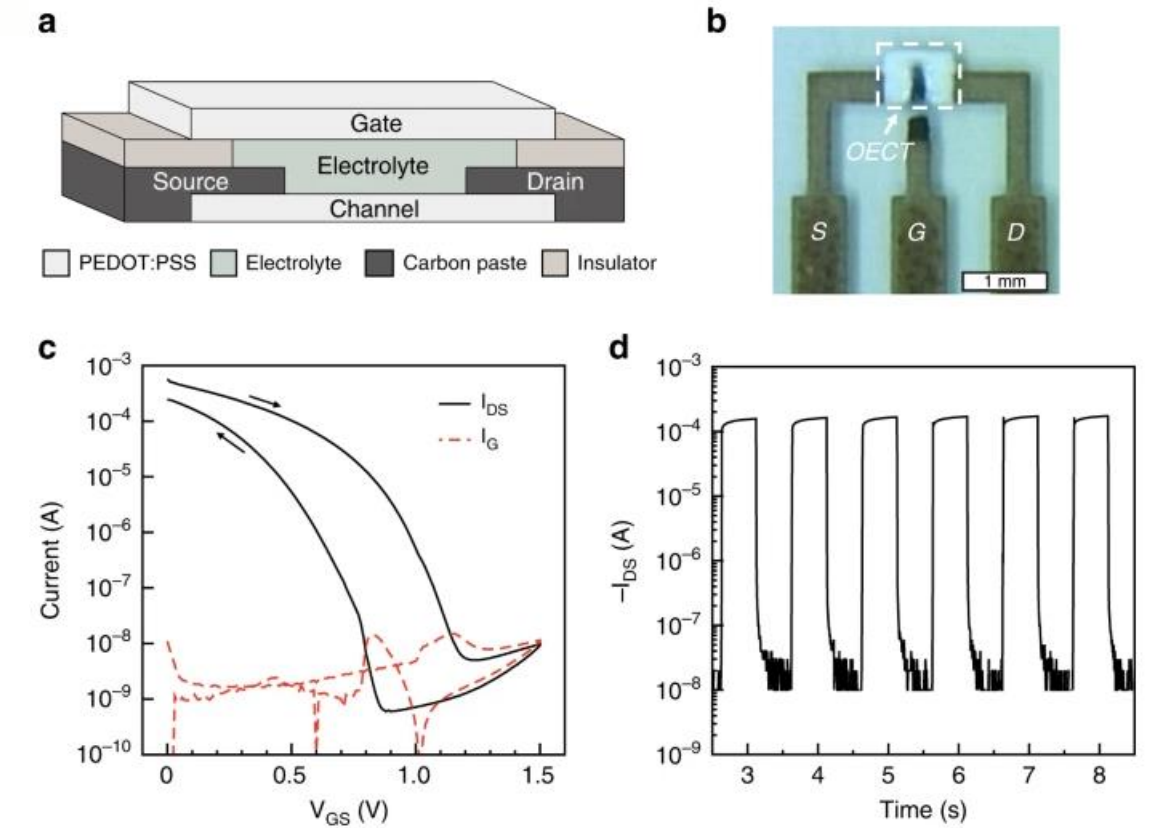
Promising in many application areas:

Logic circuits for addressing

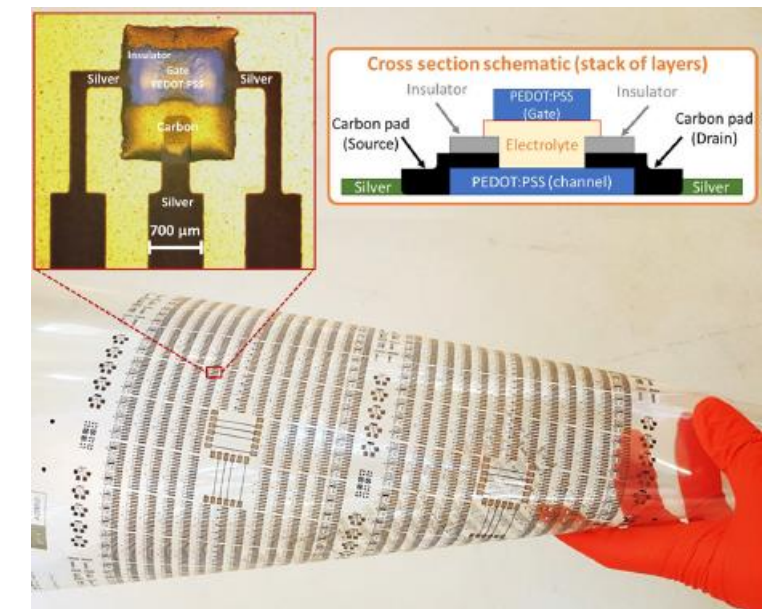
Recording (EMG)

Functional Electrical Stimulation

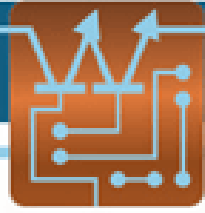
Sensors, e.g. in stretchable electronics



Nature Communications, **10**, 5053 (2019)

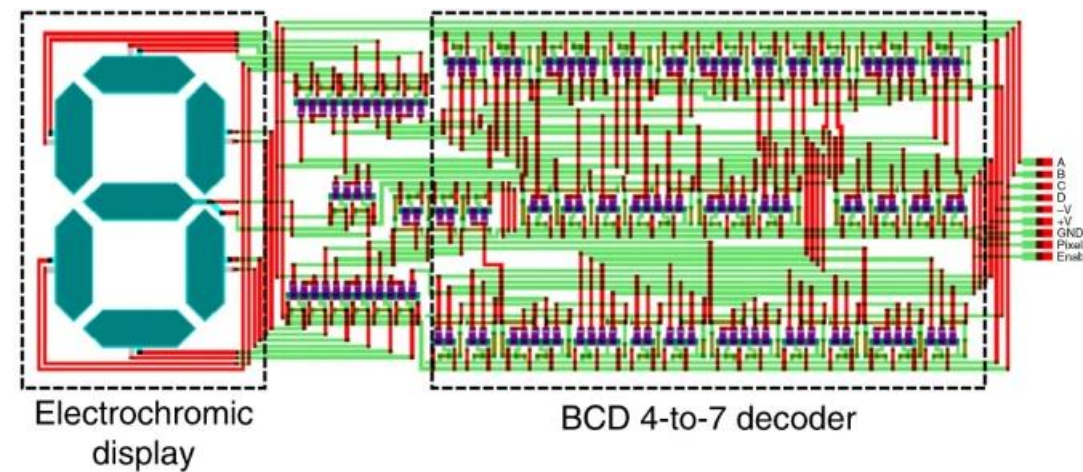
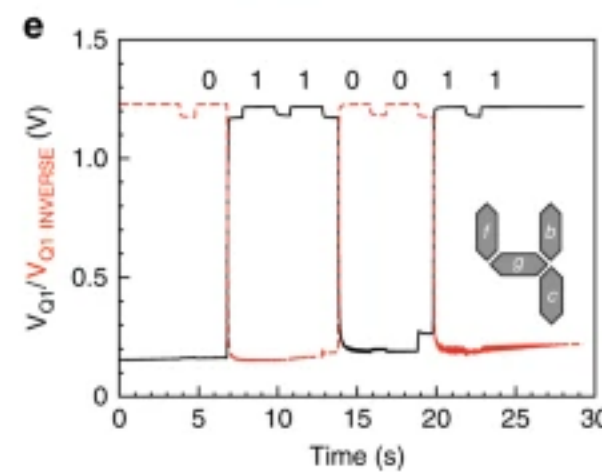
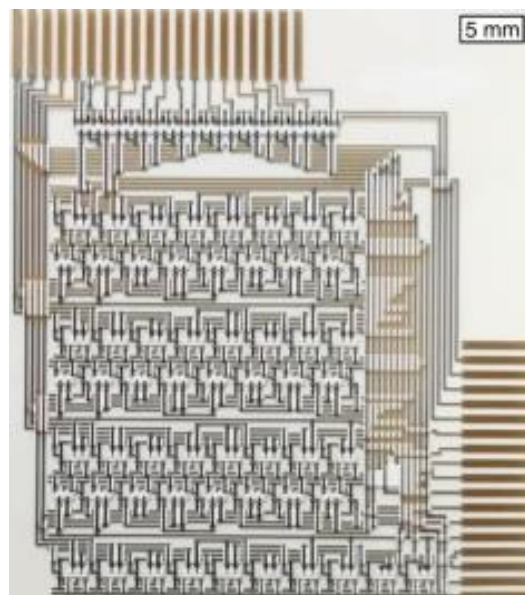
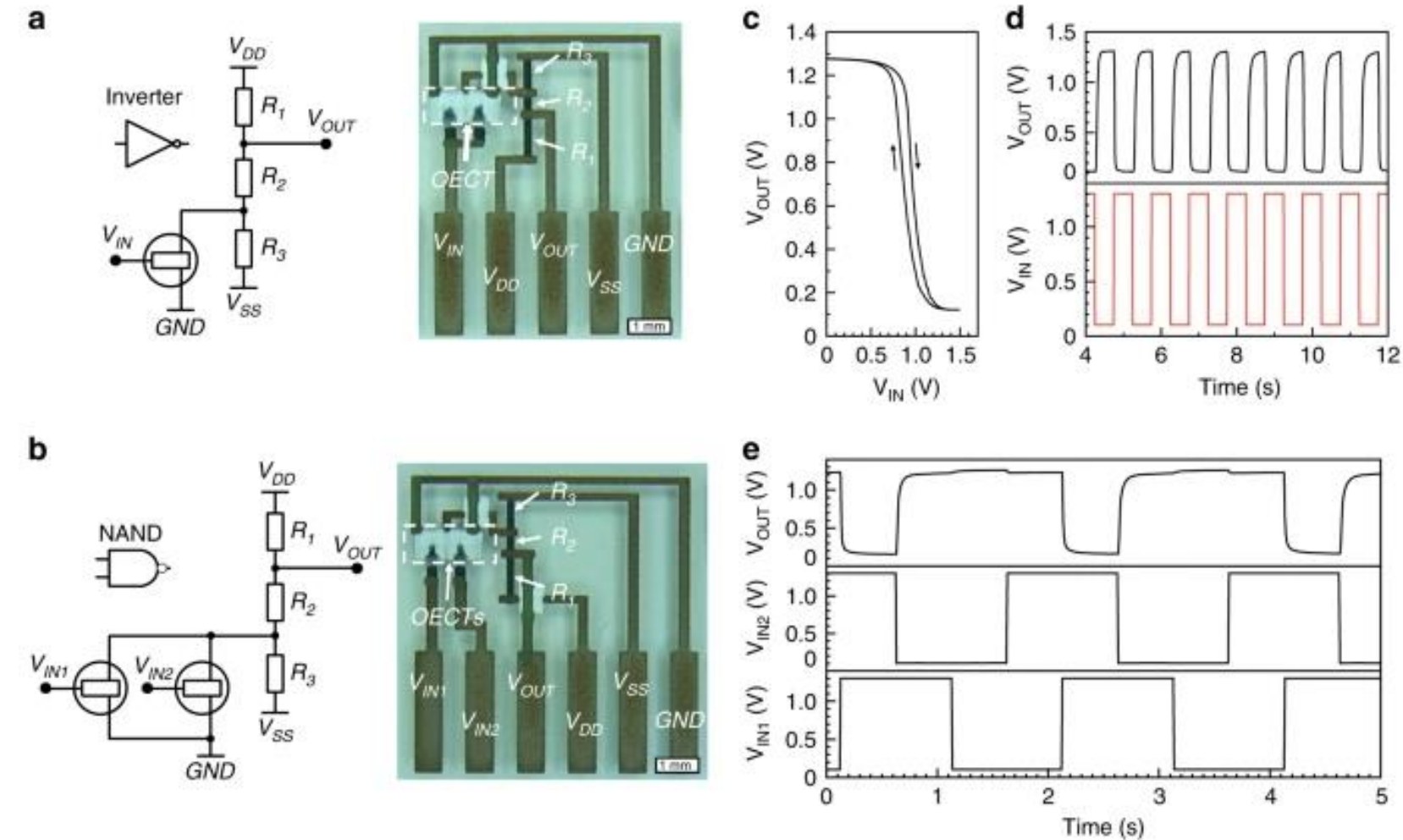


npj Flexible Electronics, **4**, 15 (2020)

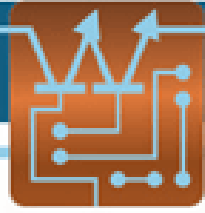


Screen printed logic circuits

- Simple logic circuits for addressability
- Possible to integrate into complex circuitry
- Monolithic integration with peripheral devices
- Compatible with large loads, e.g. displays
- Decoders and shift registers



Nature Communications **10**, 5053 (2019)



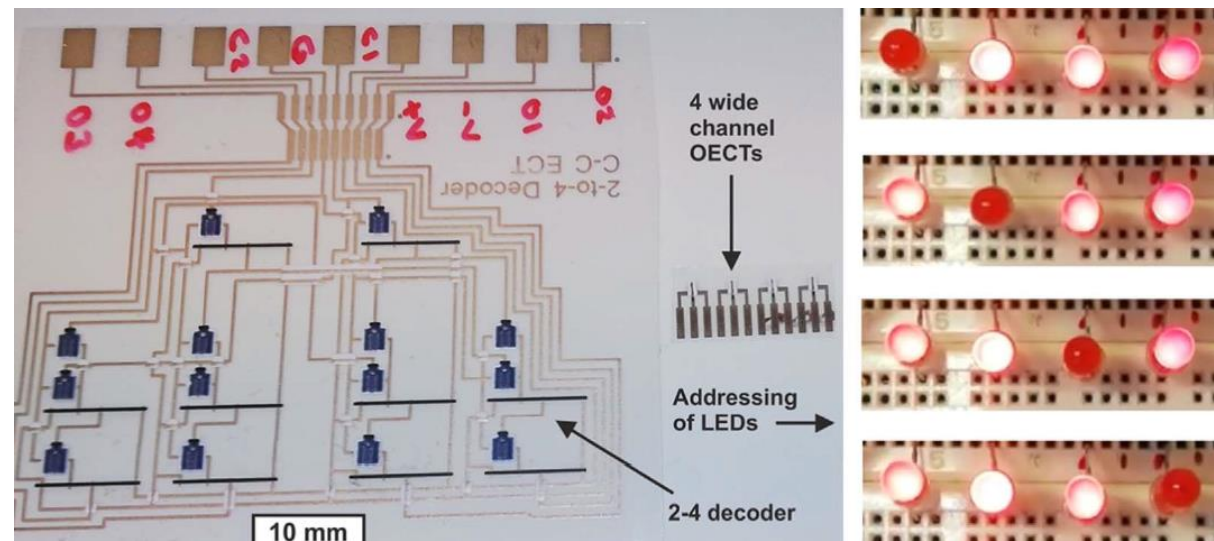
Screen printed logic circuits

Reproducible switching performance

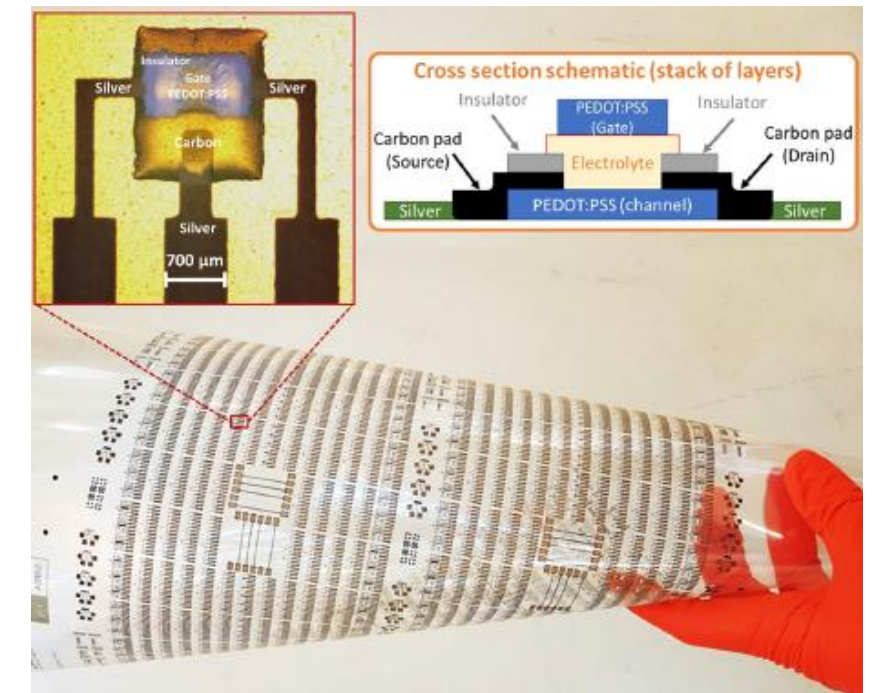
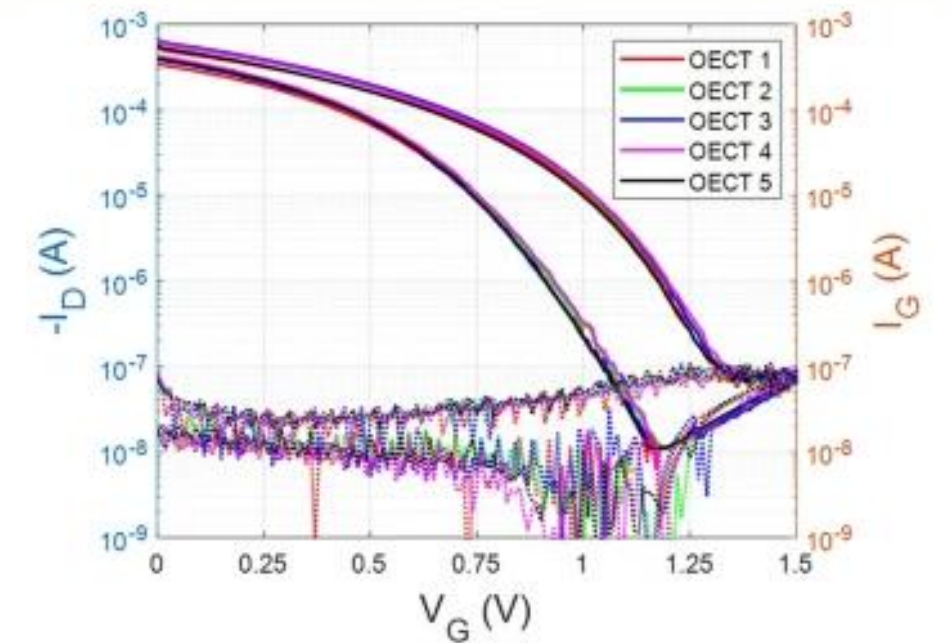
High manufacturing yield

758/760 OECTs in one sheet operational (99.7 %)

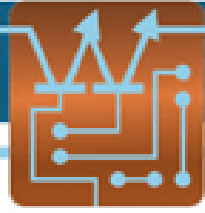
Addressability and high current throughput



Flexible and Printed Electronics, 5, 024001 (2020)



npj Flexible Electronics, 4, 15 (2020)



Link to WEARPLEX?

- » The target is to develop printed OECT-based circuits that can be integrated into the multi-pad electrodes, to simplify addressing by minimizing the number of wires
- » The printed circuits should preferably work 'in both directions', i.e. in both recording and stimulation applications, to enable multi-purpose usage

