

WEARPLEX Beta Workshop: Electronic inks for biomonitoring applications



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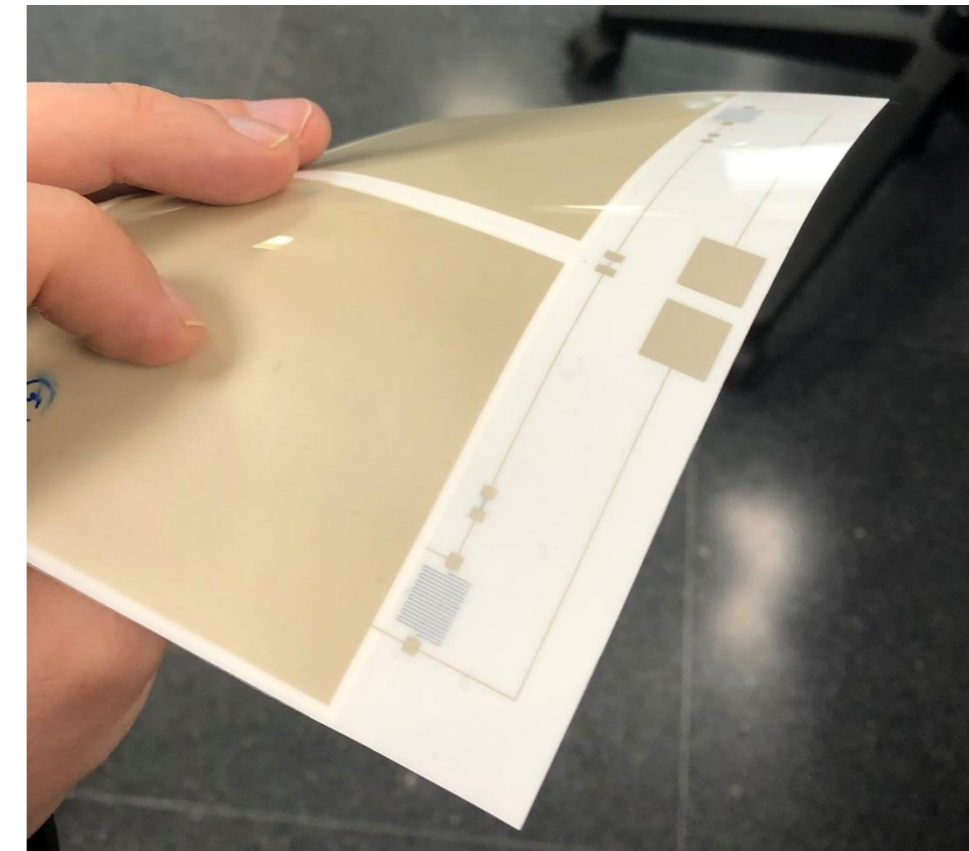
24th March 2021

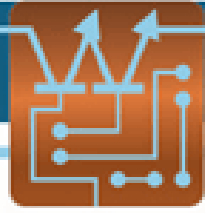


Introduction

Advanced biomonitoring applications require development of new inks with tailored functional properties, such as:

- **High electronic/ionic conductivity**
- **Biocompatibility**
- **Flexibility/stretchability**



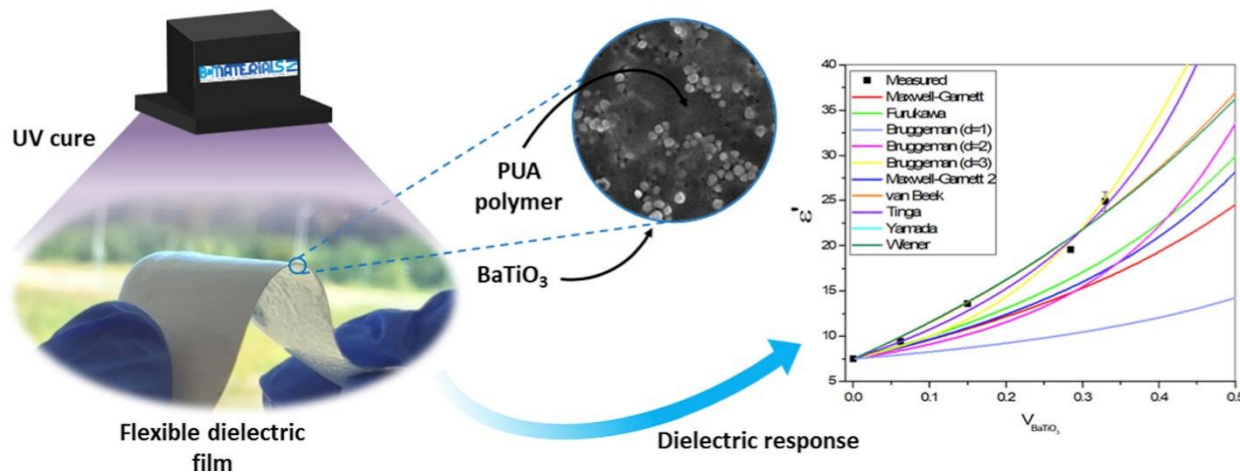


Inks developed by BCMaterials

» Functional inks based on:

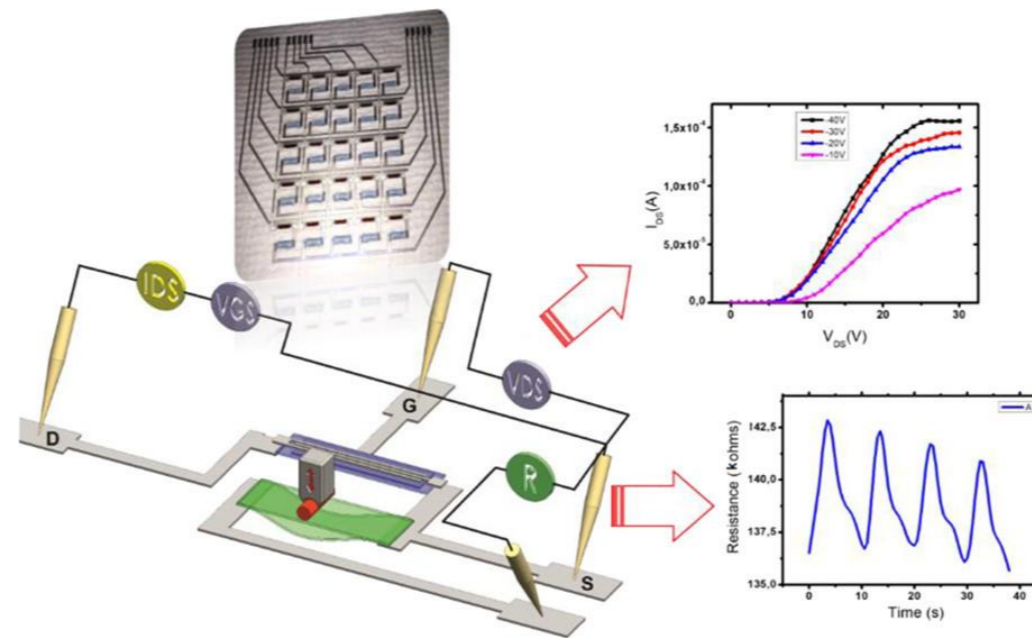
- » dielectric materials (UV curable resins with dielectric nanoparticles, water-based inks, green solvent-based inks)
- » semiconducting materials (based on metal oxides, piezoresistive nanocomposite materials)
- » magnetic materials (polymer binder (active or passive) with magnetic nanoparticles, water and green solvent-based)

Dielectric inks



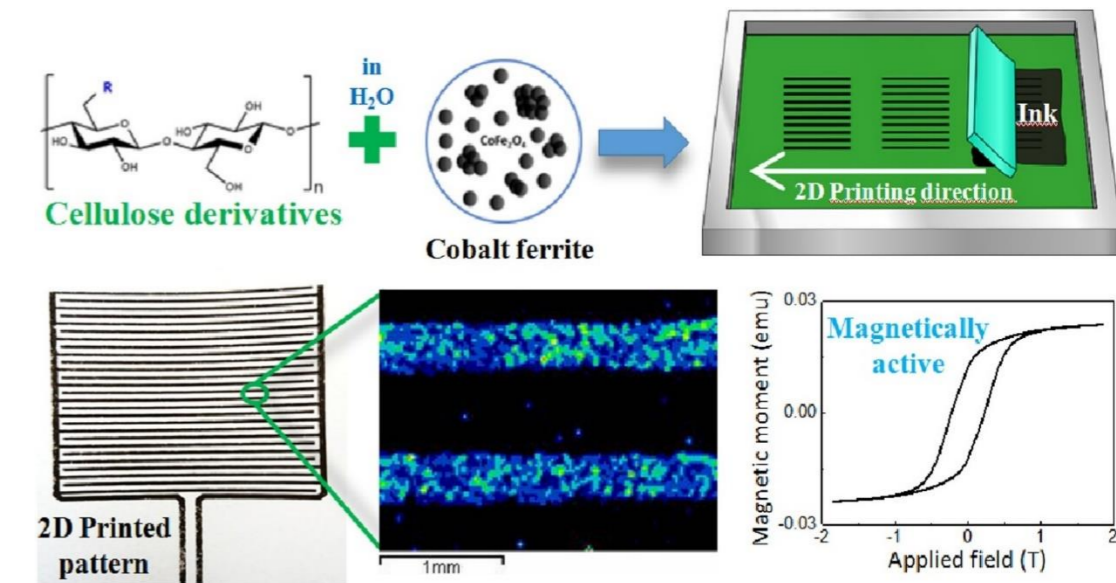
C. Mendes-Felipe et. al. *Polymer*, 2020, **196**, 122498

Semiconducting inks

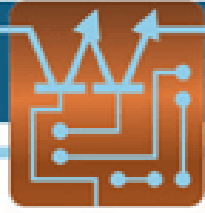


V. Correia et. al. *ACS Appl. Electron. Mater.* 2020, **2**, 5, 1470–1477

Magnetic inks



M. Rincón-Iglesias et. al. *Carbohydr. Polym.*, 2020, **233**, 115855

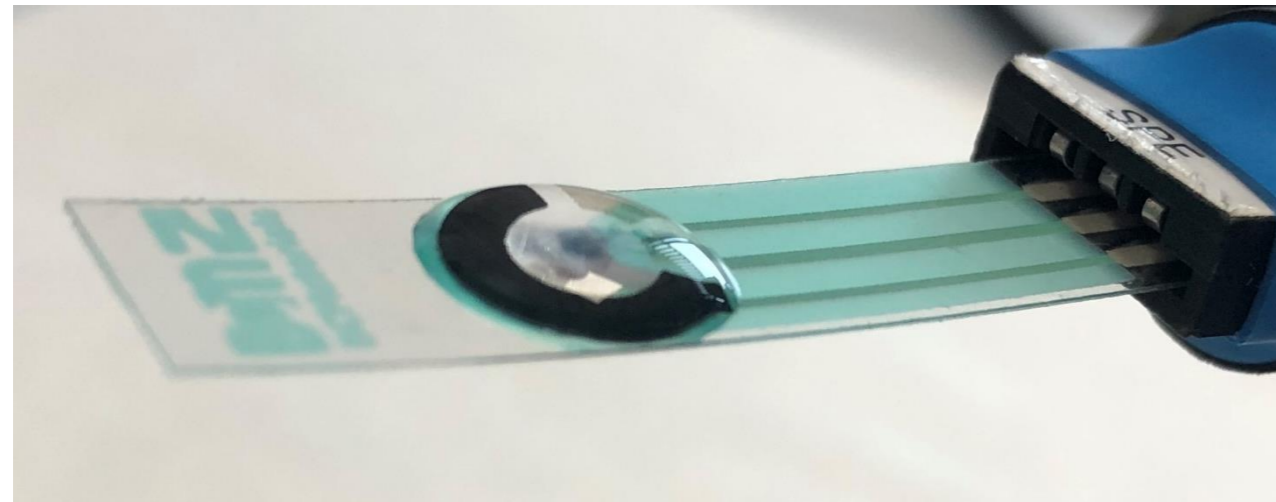


Inks developed for Wearplex

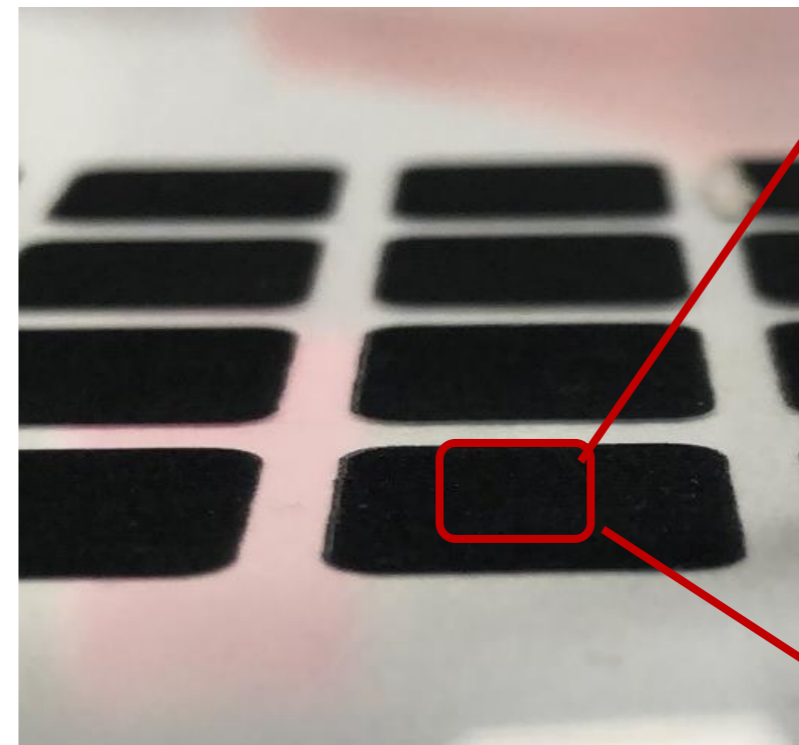
Dielectric inks – inks with tunable dielectric constant (UV curable) based on **ITO** and **BaTiO₃** nanoparticles

Conductive and Semiconductive inks – screen-printable inks based on **rGO** (from **Abalonyx**) for the electrode/skin interface, and **PEDOT:PSS** for channels of the **OECTs**

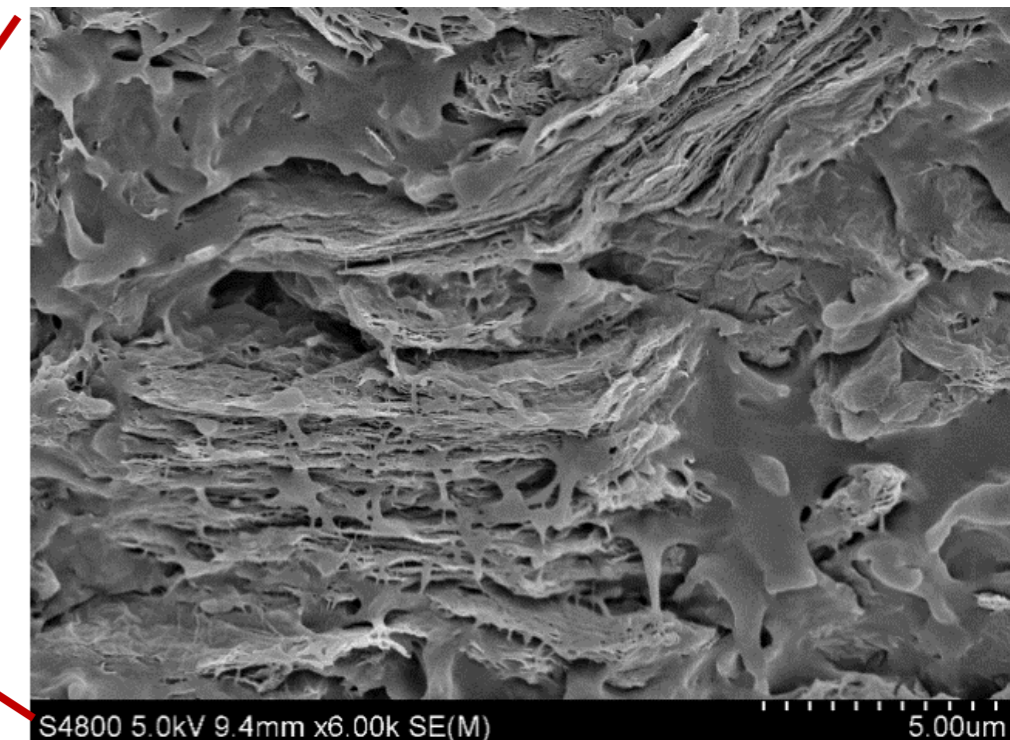
Biocompatible inks – **rGO**-based inks for inert electrodes



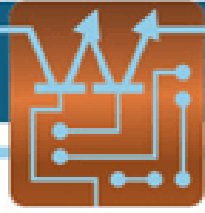
Electrochemical testing of PEDOT:PSS inks



Screen-printed rGO pads



Cross-sectional images of printed rGO layer



Future ink developments for WEARPLEX

- » Development of **rGO** (multi)functional composite inks based on electroactive polymers and other additives
- » Development of **printable conductive adhesives** for the attachment of electronic components
- » Further improvement of materials for OECTs (**PEDOT:PSS**) and **dielectric stretchable and conformable inks**