WEARPLEX Beta Workshop: Electronic inks for biomonitoring applications

Nikola Perinka\textsuperscript{1}, Karla Merazzo\textsuperscript{1}, Javier del Campo\textsuperscript{1}, Azadeh Motealleh\textsuperscript{2}, Siamak Eqtesadi\textsuperscript{2}, Rune Wendelbo\textsuperscript{2}, Senentxu Lanceros-Mendez\textsuperscript{1}

\textsuperscript{1} BCMaterials, Spain
\textsuperscript{2} Abalonyx, Norway

24\textsuperscript{th} 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

Semiconducting inks

Magnetic inks

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


Inks developed for Wearplex

**Dielectric inks** – inks with tunable dielectric constant (UV curable) based on ITO and BaTiO$_3$ 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