WEARPLEX Gamma Workshop: Electronic Inks

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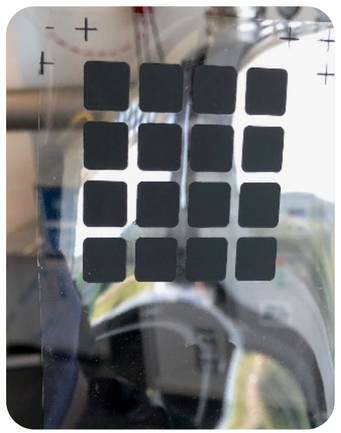
Ink development in Wearplex

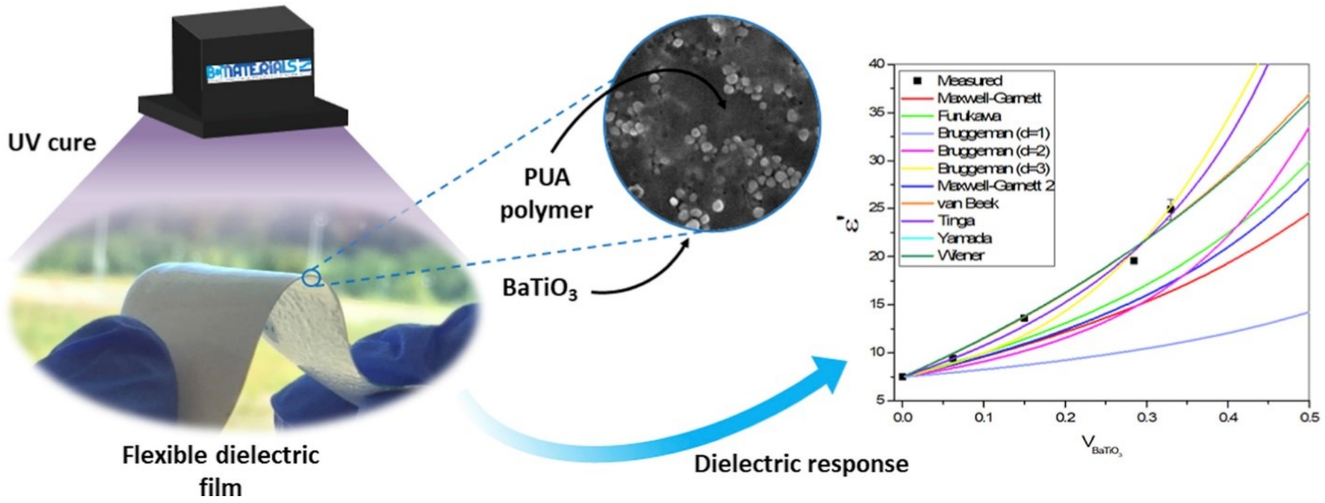
- During the Wearplex, several new materials (inks) have been developed:
  - Inks with improved mechanical characteristics (elasticity for textile applications)
  - Inks with improved electrical/electrochemical performance
  - Biocompatible inks



Dielectric ink development

» BCM has developed **dielectric UV curable nanocomposite-based inks** with improved dielectric and mechanical characteristics:

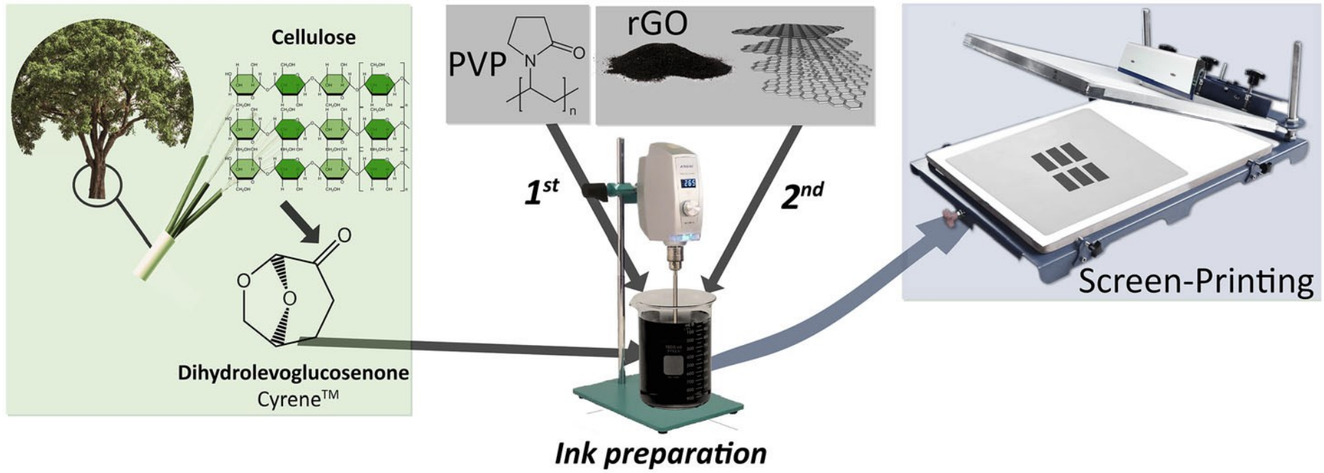
» Based on $BaTiO_3$/Polyurethane acrylate (ε ~ 25, elongation up to 25 %)

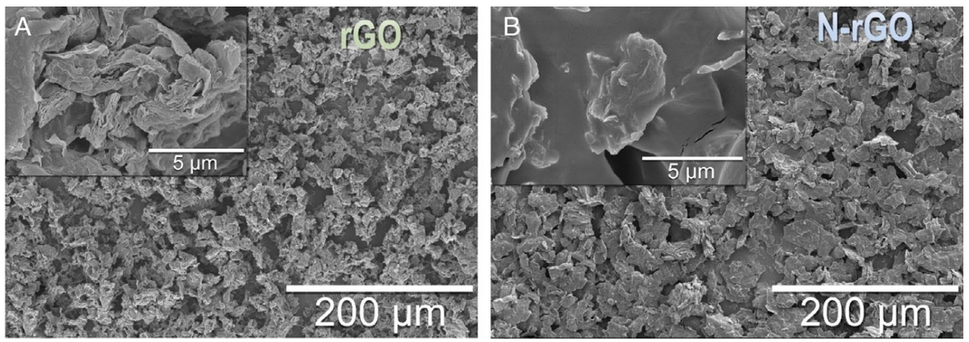


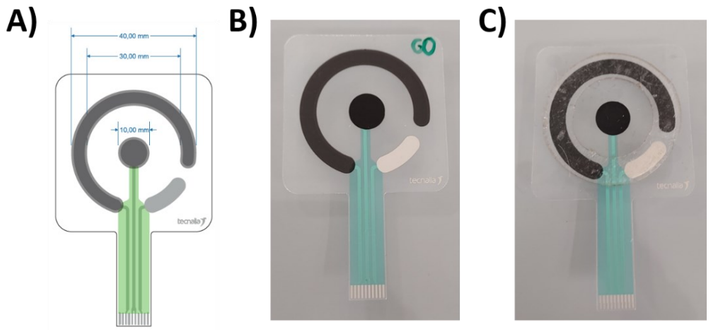
C. Mendes-Felipe et. al. ***Polymer***, 2020, **196**, 122498

Semiconductive/Conductive ink development

- **Reduced Graphene Oxide (rGO) inks**
  - Water based inks
    - Based on green solvents
    - Water soluble polymers
  - Solvent based inks
    - Proved to be biocompatible
    - Conductivity up to 10^0 S/cm
    - Validated for FES applications







M. Franco et al. ***Adv. Eng. Mater***. 2022. 2101258

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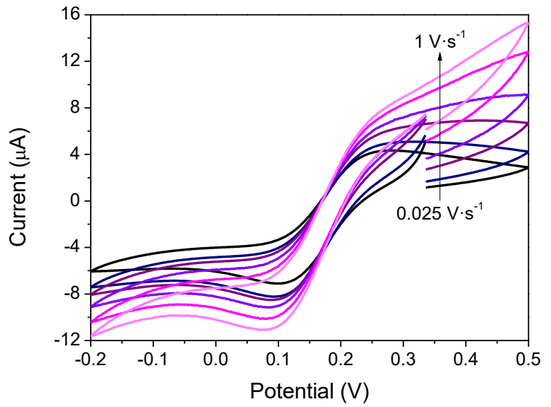
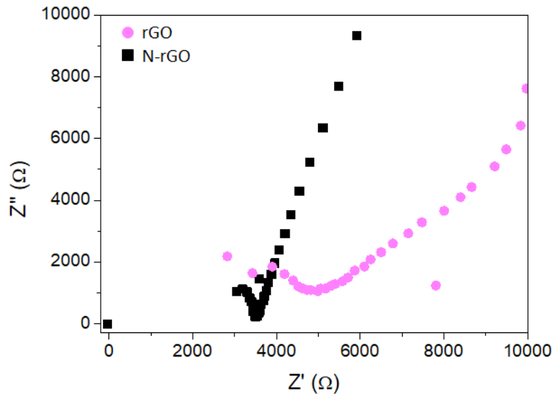
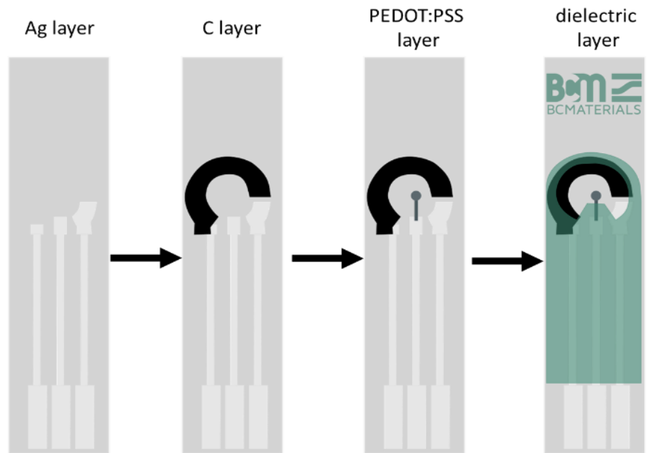
Electrochemically active ink development

- **rGO inks**
  - Solvent based inks
    - rGO based
    - N-rGO based
- **PEDOT:PSS inks**
  - Water based inks
    - Screen-printable
    - With different PEDOT:PSS ratio
    - With different green surfactants







Future outlooks from Wearplex

- New inks for bio-monitoring, based on novel materials (rGO) and green solvents have been developed and proved to be functional in:
  - OECT devices
  - FES applications
- They accomplish the functional and processability requirements for the implementation of bio-monitoring devices in large-scale application.