

### Project 3 Interlaboratory study of sheet resistance measurements for smart textiles and heterogeneous printed layer electrodes

#### Background

Sheet resistance of the electrode is a key parameter for the development of printed electronics. However there is no standard method for characterization of sheet resistance of inhomogeneous conductive electrodes such as textiles and heterogeneous printed layers. The traditional 4-point probe method used for thin film electronics is not suitable as has been demonstrated anecdotally by several research groups. Multiple companies and research institutes have developed extended 4-point probe methods, however these have never been validated nor compared to check for consistency among variations of the method.

#### Objectives

This interlaboratory study will investigate the suitability of extended 4-point probe sheet resistance measurements by comparing existing measurement protocols and propose a harmonised method that may provide the basis for a future IEC standard.

#### Standardization Needs

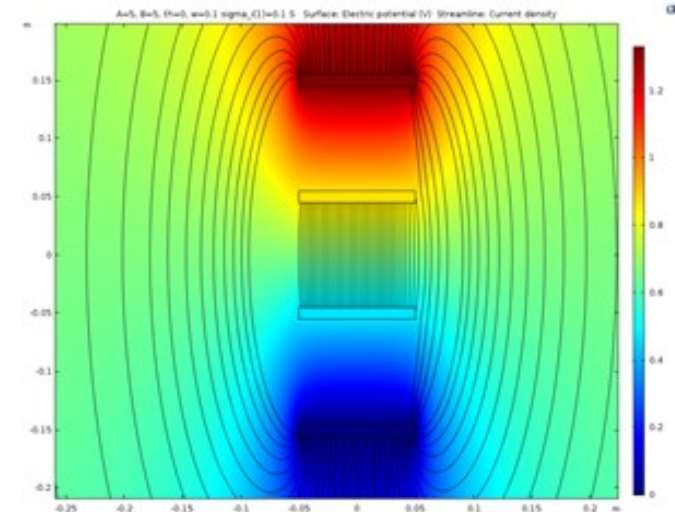
There are no known existing standards for the measurement of sheet resistance of smart textiles and heterogeneous printed layers. Existing methods are suitable for rigid homogeneous thin films or for linear electrical resistance measurements of textiles (e.g. EN 16812).

There is both published and anecdotal evidence of incorrect measurements of sheet resistance of smart textiles and heterogeneous printed electrodes when applying the existing 4-point probe or van der Paul methods.

The current level of usage for the measurements under consideration is high, given the large volume of research and development work worldwide on printed and wearable electronics, both in academic and industrial organisations.

#### Work Programme

Existing measurement protocols will be identified and compared. Based on the results, a harmonised measurement protocol will be proposed.



An interlaboratory study will be undertaken to validate methods and check for consistency of results across laboratories.

#### Project Status

- Development of a reliable 4-point probe measurement suitable for flexible electronics.
- Draft procedure for the determination of sheet resistance of inhomogeneous printed layers.
- Looking for interested partners for interlaboratory study.

#### Deliverables and Dissemination

- Harmonised measurement protocol
- Interlaboratory study
- Publications in scientific journals
- Input to standardisation committees

#### Funding

Participation is based on in-kind effort from the volunteers.

Expressions of interest to participate in the activity will be welcome.

#### For more information:

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