

Thermal behaviour of screen-printed graphene based pastes

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Resistive heating is the process by which an electric current pass through a conductive material (the resistor) and releases heat. Carbon based inks and pastes are promising materials [1][2] for this application due to their self-limiting behaviour with the temperature and because they can be printed on a variety of surfaces [3]. This work analyses the thermal behaviour of different carbon formulations on glass.

Four different materials are being tested. All of them are based on graphene (GNP and rGO) as well as CNT derivatives. Glass has been selected as the substrate to analyze the thermal behaviour of those pastes. Voltages up to 220 V are applied to the deposited material and the temperature increase is registered with a thermographic camera.

Current work is being performed comparing the behaviour of the four formulations in a simple pattern, a linear resistance. Preliminary results obtained with one of the formulations deposited in glass are shown in Fig1. An increase of more than 10 degrees is registered in few minutes when 30 V were applied, whereas when applying 220V the increase is too fast and the glass breaks. Different parameters, as thickness, resistivity and the composition are analysed. The goal is to identify optimal formulations for resistive heating applications.

References

- [1] Indrani Banerjee et al. Materials Today: Proceedings 3 (2016) 4035–4039
- [2] Faisal Shahzad et al. A volume in Micro and Nano Technologie, (2017,) Pages 113–134
- [3] Zhenyu Chu et al. Sensors and Actuators B 243 (2017) 919–926

Figures

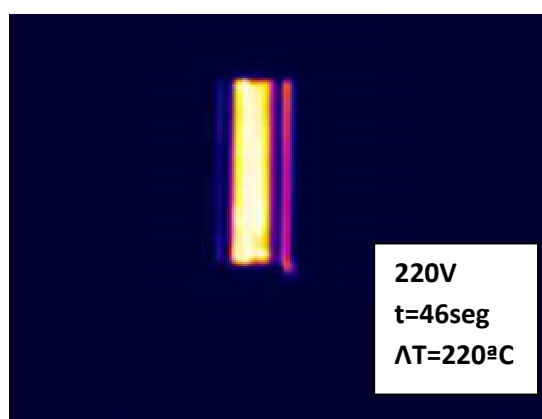
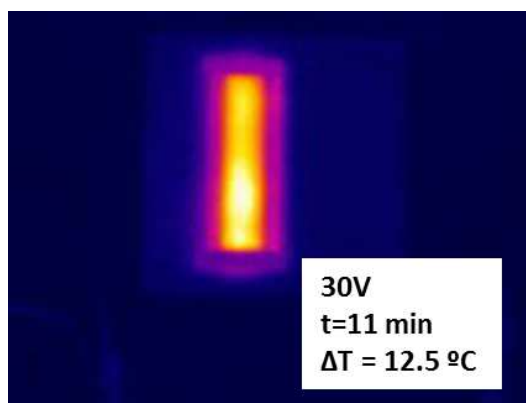


Figure 1: Thermographic image obtained with a graphite paste
