BIO

High definition screen-printed interdigitated structures for sensors and thin film transistors

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Abstract:

In the past decades, printed electronics has gained increasing relevance. However, apart from traditionally used silver, carbon and conductive polymer based conductors and dielectric inks, there is still a lack of reliable inks and applications of advanced functional materials, including printable semiconductors, photoactive, piezoresistive, piezoelectric or magnetically active materials. Therefore, new types of inks are currently being developed for a variety of printing technologies, in order to achieve suitable sensors, actuator and electronic components compatible with the requirements of the industry 4.0 and the internet of things. Among the most used printing techniques are nowadays inkjet printing and screen printing, where inkjet printing still does not show sufficient robustness, suffering from relatively small market as well as low repeatability of the process to assure a short term industrial transfer of this technology. As an alternative, this work shows the possibility of printing high definition interdigitated structures for sensors and thin film transistors by screen printing to support the scalable implementation of smart low-end functional devices and components.

In particular, inks based on silver micro- or nano-particles (and reduced graphene oxide) have been printed with line resolutions from 20 to 120 µm, and also combined with inks based on inorganic semiconducting nanoparticles, resulting in conductive lines with applicability in areas such as temperature and deformation or sensors, photodetectors and transistors.