Conductivity and contact resistance of inkjet structured transparent ribbons and wires

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Transparent conducting thin films have gained attention during the last decade in particular for their applications as transparent electrodes in photovoltaic cells or flat panel devices [1,2]. Both, Indium Tin Oxide (ITO) as well as Poly(3,4-ethylenedioxythiophene): Polystyrene sulfonate (PEDOT:PSS) have been widely studied in this context. For future flexible sensor applications, we have performed a comparative study of the conductivity and the contact resistance of microstructures and microwires of these transparent conducting materials. The structures were obtained using spincoating, inkjet micro-structuring and inkjet printing techniques on glass, ITO/glass and flexible substrates (PET), ITO/PET. Current-voltage curves, as well as contact resistance measurements were performed using an electrical microbot probing system (miBot™). Variation of temperature during and after deposition, UV exposure, as well as the use of additives (e.g. DMSO [3] and silver nanoparticles) were used in order to obtain improved conductivity of the PEDOT:PSS microstructures. We have investigated the influence of the additive concentrations on the electrical properties and morphological structures.

We present our methods of inkjet microstructuring and the results from electrical microprobing and AFM analysis for different additives concentration.

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References

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