P tfts in electronic textiles: chemical properties

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p { margin-bottom: 0. 1in; line-height: 120%; }a: link { }Rather than regular substrates used for the creation of electronicthin-film devices, for example, semiconductor wafers, glass platesetc. the mechanical and geometrical properties of fibres and yarnsare less advantageous. Hence, the successful fabrication oftransistors requires a modification of the fabrication process and aproper selection of suitable yarns or fibers. a range of possible substrate fibers e.

g. steel and cotton yarns, nylon fibers with different diameters, glass fibers, and thininsulated metal Cu wire. All materials have certain advantages anddisadvantages concerning the fabrication of smart textiles but hereare most important parameters for the fabrication of TFTs inelectronic textiles: ChemicalpropertiesThe chemical stability of the fiber material is a key aspect sincethe fibers have to resist the etchants and solvents used during thefabrication process. In this respect the metal and glass fibersexhibit the most beneficial properties.

TemperatureresistanceThe melting or glass transition temperature of the evaluatedmaterials can significantly limit the choice of usable depositiontechnologies. While the maximum temperature of cotton and nylon is inthe range of 200 ? C, the glass fiber can be processed attemperatures above 1000 ? C. FibersurfaceThin-film devices are made from active layers with thickness in thenanometer range, hence the surface of the fibers has to be as flat aspossible. While the steel and cotton yarns do not exhibit acontinuous surface, also the surface roughness of the other fibersvaries strongly.

ConductivityNon-conductive fibers (glass, cotton, nylon) have the advantage thatno additional insulation layer is needed, and all electronic deviceson their surface are decoupled from each other. Metallic substratefibers at the same time, could simplify the device structure byproviding electronic functionality themselves. Here an interestingoption could be the use the insulated Cu wire as substrate fiber, gate contact and gate insulator simultaneously. TextilepropertiesUnobtrusive smart textiles needs electronic fibers which are soft, bendable, and with dimensions comparable to the textile yarns of thefabric. In this respect cotton but also steel yarns have beneficialproperties. Similarly, polymer fibers such as nylon are common.

Anyway, the diameter of the nylon fibers should not be too large (750 ? m). Furthermore, thin Cu wires are bendable and can be imperceptible whenintegrated into a textile . Glass fibers on the other hand exhibit asmall diameter, but their minimum bending radius is limited to ? 5cm.