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# **Flexible Electronics for Smart Textiles**

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### **Textile Integration Technology**





Warn Contact





Process Kapton substrate in clean-room

Cut substrate into stripes

Weave stripes on commercial weaving machine



Schematic of textile integration technology for electronics



### **Smart Textile Prototypes**





Accelerometer and temperature/humidity sensor integrated into woven textile. Sensors are interconnected with I<sup>2</sup>C bus. Polymer-based gas sensor woven into textile.



## **Flexible Thin-Film Circuits**

Strain applied to logic gates based on n-type Indium-Gallium-Zinc-Oxide thin-film transistor



Flat substrate		Bending radius: 3.5 mm				Reflattened substrate			
≥ 4 – _= 2 –	Input 1	I		I		1			



Polymer-based carbon-black gas sensors on flexible foils

Sensor

#### Carbon-black filled polymer





Logic gates on flexible Substrates





NAND gate output signal under strain depends on geometrical design

1 mm Gold electrodes 1.08 Set of four different carbon-Methano cetone ethano etone black filled polymer gas sensors exposed to solvents PVBU fusion allows data distinguishing different solvents 100 120 140 160 180 200 80 60 40 0 20 Time (min)