8th International scientific conference
„*Contemporary trends and innovations in the textile industry*"
18-19th September, 2025, Belgrade, Serbia

APPLICATION OF ELASTIC AND SOFT CONDUCTIVE MATERIAL ON TEXTILES

Review scientific paper
DOI: 10.5937/CT_ITI25022N

Dušan Nešić

ICTM-Centre of Microelectronic Technologies, University of Belgrade,
e-mail: nesicad@nanosys.ihtm.bg.ac.rs, ORCID ID: 0000-0002-8046-5697

ABSTRACT: *Examples of application of elastic (stretchable) and soft conductive material on textiles are given. The elasticity and softness of the conductive material is a logical adaptation to the frequent change of shape in textiles, especially clothes, which is one of the main differences from the classic substrate in electrical engineering. Those materials can be conductive textiles, but also materials that are applied with elastic (stretchable) textiles.*

Keywords**:** *Electronics on textiles, elastic (stretchable) and soft conductive material on textiles.*

PRIMENA ELASTIČNOG I MEKANOG PROVODNOG MATERIALA NA TEKSTILU

APSTRAKT: *Dati su primeri primena elastičnog (istegljivog) i mekanog provodnog materiala na tekstilu. Elastičnost i mekoća provodnog materijala je logično prilagođavanje čestoj promeni oblika kod tekstila, posebno odeće, što je i jedna od glavnih razlika od klasične podloge u elektrotehnici. Ti materijali mogu biti provodni tekstil ali i materijali koji se primenjuju uz elastični (istegljivi) tekstil.*

Ključne reči: *Elektronika na tekstilu, Elastični (istegljiv) i mekan provodni material na tekstilu.*

1. INTRODUCTION

Application of elastic (stretchable) and soft conductive material on textiles is one of the directions of development of electronics (in a broader sense including the entire range of radio waves) on textiles [1-9]. The term elastic (stretchable) and soft conductive material implies the use of polymers and composites, but also classic non-textile materials such as rubber [10]. This also includes the use of ordinary non-conductive textiles as well as the use of some non-textile materials such as polypropylene (PP) [11] and kapton (polyimide film) [12]. As fibers, some non-textile materials also become part of textiles. Elastics (stretchable) and soft non-conductive textiles are also very important because they represent the substrate for the conductive material and must follow it in changing dimensions. It should also be noted that the use of flexible classical printed circuit boards (PSB) is also expanding [13].

2. SOME APPLICATION EXAMPLES

Figure 1. shows the need for synchronized spreading of the substrate and conductive material, in this case conductive ink.

Figure 1: Stretchable and washable filter ink printed directly on stretchable textile [14]

Figure 2. shows the application of nanowires and polymers.

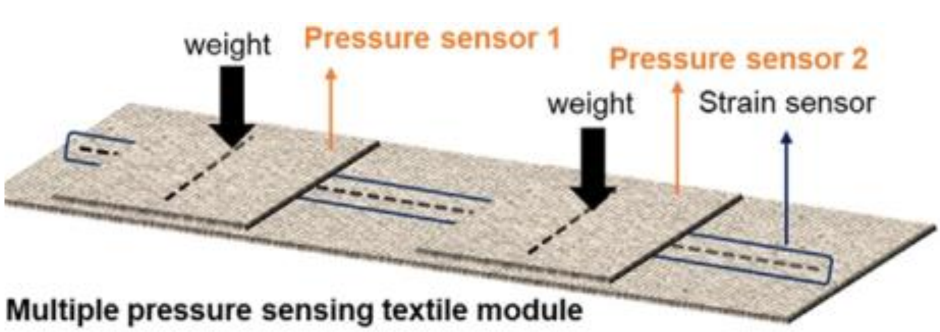

Figure 2: Mechanically robust textile-based strain and pressure multimodal sensors using metal nanowire/polymer conducting AgNW/PEDOT conducting fiber [15]

Figure 3 shows the application of a commercial stretch textile and conductive wire in a meander that can follow the stretching of the substrate.

Figure 3: Interconnect ribbon with conductive yarn that was attached onto ribbon in a horse-shoe shape [16]

Figure 4 shows an example of a commercial Stretch sensor.

Figure 4: Stretch sensor, *Holland shielding resistive systems BV* for measurement of small movements [17]

Figure 5 is an example of a sensor made of commercial materials, easy-to-build.

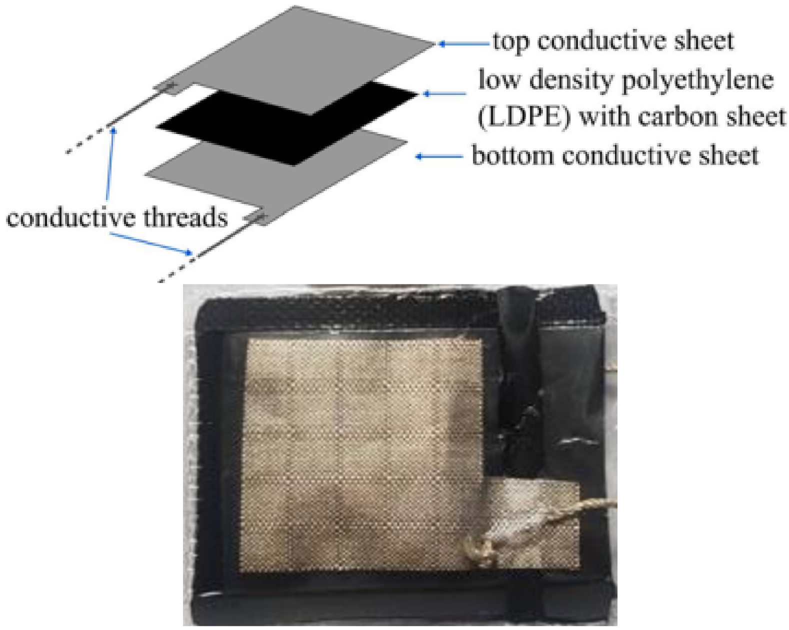

Figure 5: Easy-to-Build Textile Pressure Sensor [18]

Figures 6 and 7 shows the application of composites in sensor construction.

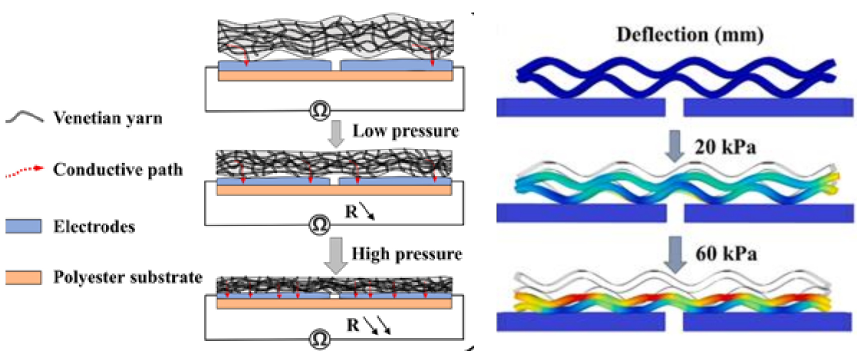

Figure 6: All textile-based robust pressure sensors for smart garments [19]

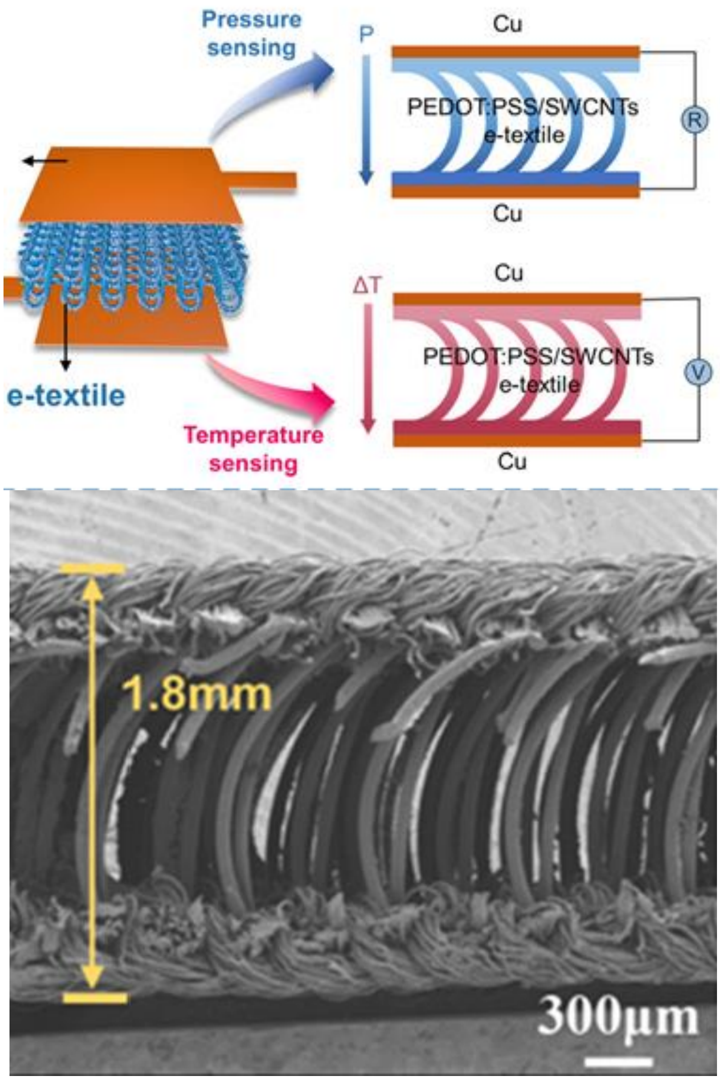

Figure 7: Dual-mode textile sensor based on PEDOT: PSS/SWCNTs composites for pressure–temperature detection [20]

3. CONCLUSION

Elastic (stretchable) and soft conductive material on textiles are increasingly present with further development. In this case, the application of new materials, but also the application of commercial materials that enable easier production, is prominent.

ACKNOWLEDGEMENT

This work was financially supported by the Minister of Science, Technological Development and Innovation of the Republic of Serbia (Grant No. 451-03-136/2025-03/200026).

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