

STRETCHABLE WEARABLE ELECTRONICS

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ABSTRACT

Wearable electronics industry is growing exponentially as well as the demand for conductive textile materials. Ideally, conductive textile materials should be washable, breathable, and easily convertible into textile products using conventional textile machinery. Stretchable wearable electronics is a research field on the cross section of textile, polymer, materials, mechanics and electronics fields. Therefore, it is essential to combine these fields to develop wearable electronics products with aforementioned properties. Dr. Gurarslan has extensive experience in these multidisciplinary fields and successfully proposed a proof of concept study to produce stretchable conductive yarn in an existing funded Horizon 2020 project, WEARONICS. In this project we have developed 100% stretchable and conductive yarn, which can be woven into washable textile materials. Stretchable and conductive yarns were coated with silver nanowires via patent pending technology that allows nanowires to elongate under stretching conditions. Stretchable and conductive yarns developed in this project were used as a touch based sensor to control a toy robot. In addition, 2-ply yarn was employed as a capacitance to measure human respiration, finger motions, and to detect the different weights. Recently received TUBITAK 1512 support is used for creating an industrial prototype of stretchable and conductive yarn. This yarn has a potential to be used in numerous applications ranging from fashion tech products to sports clothing, heating garments to wearable screen applications. Finally, Dr. Gurarslan received another TUBITAK grant to add energy harvesting feature to his patent pending stretchable conductive yarn.