

Connecting Electronic Surface Mounted Devices with Conductive Yarns by Reflow Soldering

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ABSTRACT

Electronic yarns (E-yarns) contain electronics components fully embedded into the conductive yarn's structure before manufacturing of smart textile garment or fabrics. In order to comprehensively accept electronic textiles, it is essential to integrate the electronic components into or onto the conductive textile yarn without compromising the quality of the textile substrate. Therefore, one solution is to create a flexible, stretchable conductive yarn that contains a small surface mount electronic components embedded in the fibers of the conductive yarn. The purpose of this work is to manufacture and subsequently evaluate the physical and electromechanical properties of Amber Strand (Toyobo's PBO fiber Zylon) yarns with embedded surface mount device (SMD components). The SMD component was successfully integrated into the Amber Strand conductive yarn using a bench top reflow-soldering machine. The completed encapsulated E-yarn had a tensile strength of 37.38 N with 4.1 mm extension. The relationship between the strain and electrical resistances was investigated experimentally. The analytical finding shows that, the mechanical stress had a significant influence on the electrical resistance of E-yarn.

Keywords:

Soldering, Integration, surface mount device, wearable electronics conductive yarn, e-yarn