

# Study on flexible heating nonwoven fabrics

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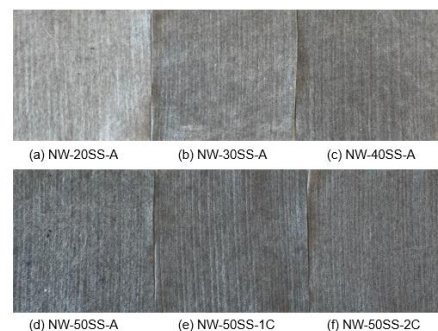
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**Abstract:** Smart textiles are textiles that can sense and react to environmental changes. It can be used not only for daily clothes but for industry fields, based on the electrical conductivity various functions can be realized. However, due to the complex processes and high costs, the mass production of smart textiles is still a problem. In this study, we developed conductive nonwoven fabrics using easy and inexpensive methods aimed at large-scale industrial production. The conductive nonwoven fabrics were produced carding or air-laid followed by needle-punching using stainless steel and polyester (SS/PES) fibers. Through modifying the content of SS fiber (20%, 30%, 40%, 50%) and the web formation method (air-laid and carding), the effects on electrical and thermal properties were evaluated.

It was found that with the increase of SS fiber, both the electrical and thermal properties become better. Fabrics with air-laid method have better performance than carding. Fabric with 50% SS fiber produced by air-laid method has the lowest resistivity ( $\sim 3.66 \Omega \cdot m$ ) and highest temperature (increased by around  $26^\circ C$  at 15V in 5 min). In addition, the electrical properties are anisotropic and affected by pressure, the web produced by air-laid method has higher conductivity at cross-machine's direction (CD), while the web produced by carding showed better performance at machine's direction (MD). And with pressure, the conductivity can be improved.

**Keywords:** Smart textiles, conductive nonwoven, heating fabric

**Figure 1** shows images of the fabrics produced and characterized. The size of the fabric is 11 cm x 11 cm.



**Figure 1. Electrically conductive nonwoven fabrics with different content stainless/steel and polyester fiber using different web formation methods**

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