

# Exploring the Triboelectric Energy Harvesting Performance of Needle Punched Nonwoven Structure

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**Abstract:** Transformation of wasted mechanical energies into electrical outputs has immense potential to mitigate the present problem of energy crisis. Triboelectric nanogenerator has evolved as an effective device which can generate electrical energy from frictional motions. Nonwovens, a unique class of textile materials, are used both in proximity with human body as well as in numerous technical applications. Involvement of such demanding textile structures as triboelectric layer may broaden the scope of harvesting wasted mechanical energies associated with various application fields. Needle punching is a mechanical bonding technique for providing structural integrity within a fibrous web. This technique is well-known for its easy processability and is an economically viable option. Flexibility in raw material selection and robust output products are other highlights

of this technology. In this work, needle punched nonwoven has been used as a triboelectric layer. Detailed experimental analysis has been performed to uncover the influence of structural parameters of needle punched nonwoven affecting the triboelectric energy harvesting performance.

**Keywords:** *needle punched nonwoven, triboelectric, energy harvesting, fibre fineness, fibre packing density.*

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