Exploring Solution Blowing Technique for High-Performance Nanogenerator Fibers: Submicrometric Diameter and Enhanced Piezoelectric Properties

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Abstract: Nanogenerators have emerged as a promising solution to address the ever-increasing demand for portable and sustainable power sources. These small-scale devices can convert ambient mechanical energy into electrical energy, offering potential applications in various fields, such as wearable electronics, self-powered sensors, and biomedical implants.

The need for nanogenerators arises from the growing need for energy harvesting in compact and flexible devices. Nanogenerators can efficiently scavenge mechanical energy from the surrounding environment, converting it into electrical energy. This technology eliminates the dependence on traditional power sources and provides a sustainable and self-sufficient energy solution. To achieve high-performance nanogenerators, the development of suitable materials and fabrication techniques is essential.

The current work explores the use of the solution blowing technique to fabricate fibers from a PVDF/PEO blend. The resulting fibers exhibit a submicrometric diameter range, with an average diameter of 2.5 microns. The presence of the beta phase in the fibers, confirmed by Fourier-transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD) analyses, coming out to be around 80% without the need for poling. The output voltage obtained from a nanogenerator device measuring 2 cm by 2 cm reaches around 4 volts peak-to-peak.

This research demonstrates the successful fabrication of high-performance nanogenerator fibers using the solution blowing technique. The obtained fibers possess desirable characteristics such as submicrometric diameter, significant beta phase content, and efficient electrical output. These findings open up opportunities for integrating nanogenerators into various applications, allowing for the efficient conversion of mechanical energy into electrical power.

Keywords: *piezoelectric,nanogenerators,fibres,solution blowing.*

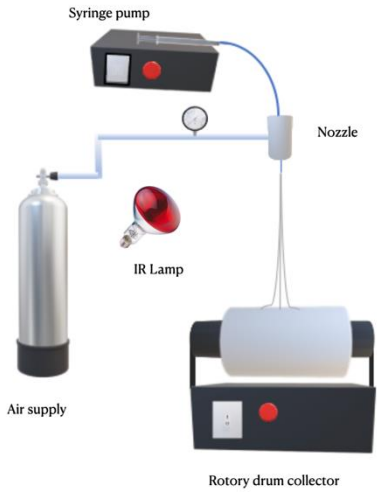

Figure 1 Schematics of solution blowing

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