Electrospun Polyvinylidene Fluoride (PVDF) blended with Cellulose Nanocrystals (CNCs) as Piezoelectric Material

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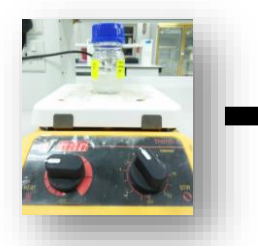
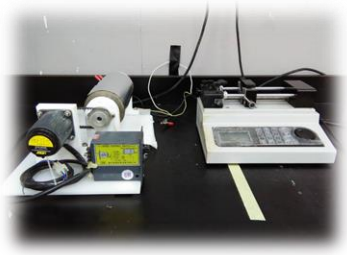
Product Background

- PVDF is a semi-crystalline polymer
- Excellent thermal stability, light weight, high flexibility
- Sensors, actuators, transducers, energy storage, energy harvesting
- Three main crystalline phases (*α,β* and *γ*)
- *β*-phase of PVDF give rise to a piezoelectric constant (electroactive state)
- Incorporating CNCs into PVDF to improve mechanical and electrical properties

Methodology



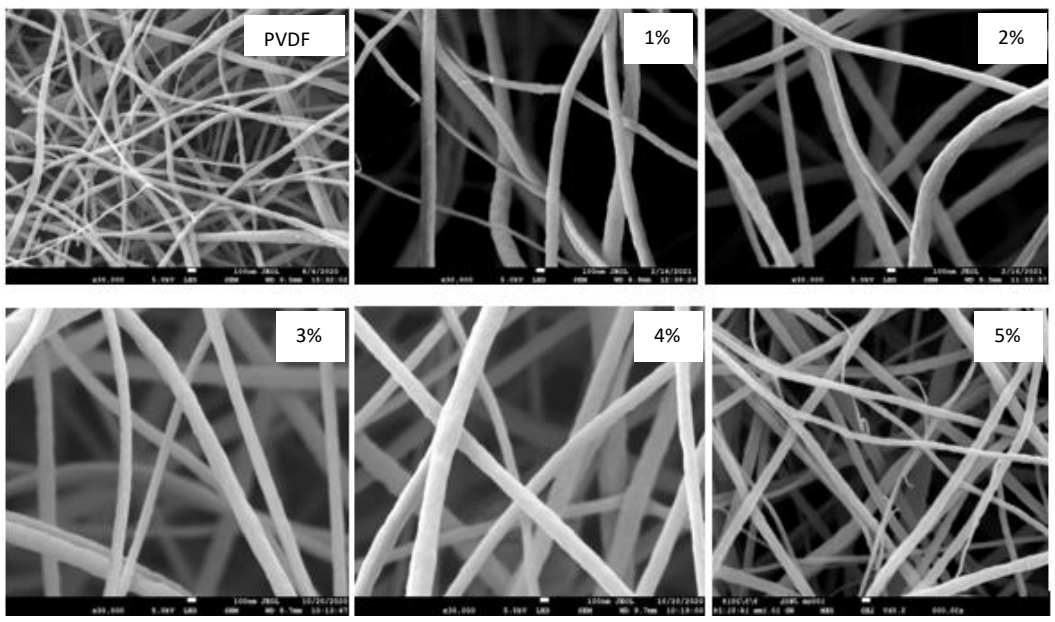
Stir PVDF/CNCs with DMF/Acetone at 70 °C (12 hours)



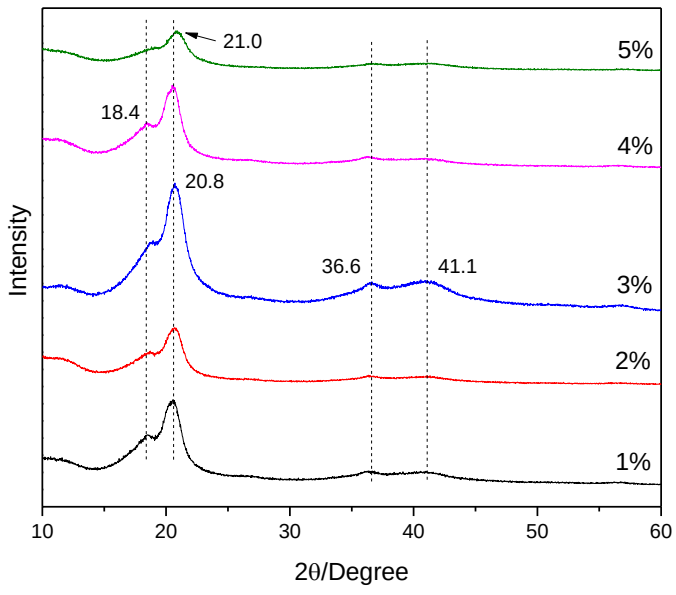
Electrospinning

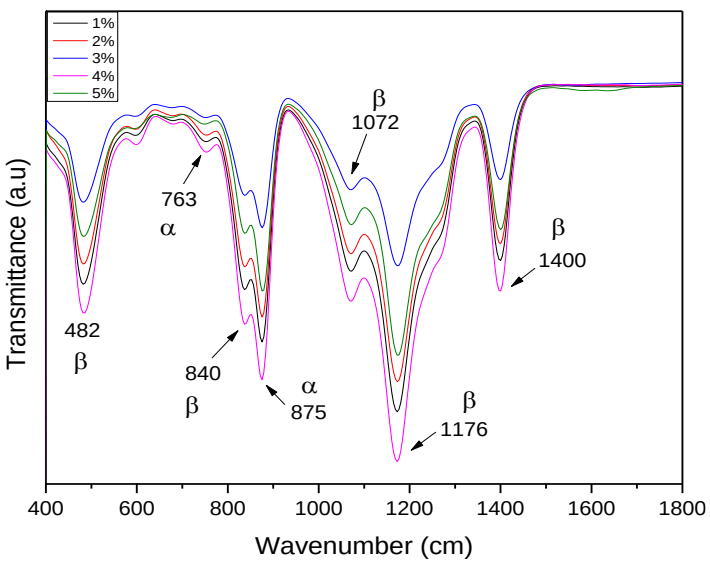
PVDF/CNCs membrane

Characteristics



Samples	*β*-phase volume fraction, F_β [%]	Piezoelectric constant, d_{33} [pC/N]
PVDF	80.25	21
1% CNCs	83.43	18
2% CNCs	85.00	32
3% CNCs	86.91	34
4% CNCs	91.74	45
5% CNCs	82.33	17





Novelty

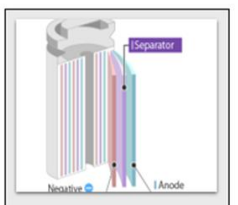
- Increase piezoelectric constant of PVDF after blended with CNCs
- Encourage formation of *β*-phase
- High *β*-phase content
- Increased voltage output

Usefulness Applicability

WEARABLE DEVICES

FILTRATION EQUIPMENT

PIEZOELECTRIC MATERIALS



BATTERY

Potential collaborators

Acknowledgement

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