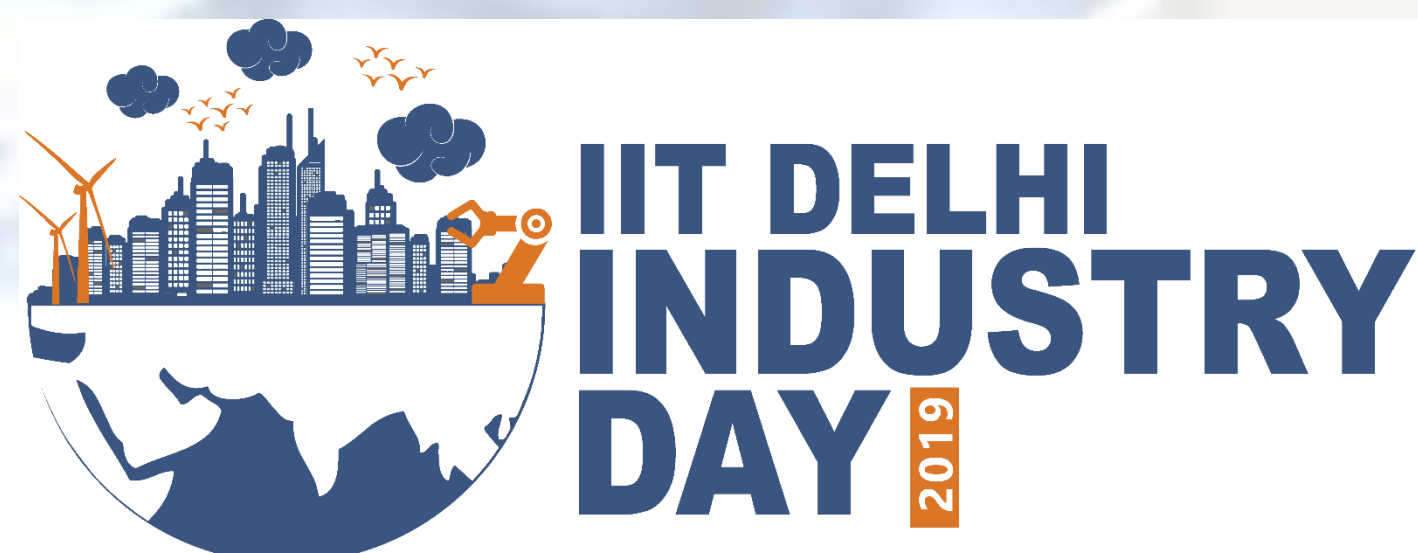


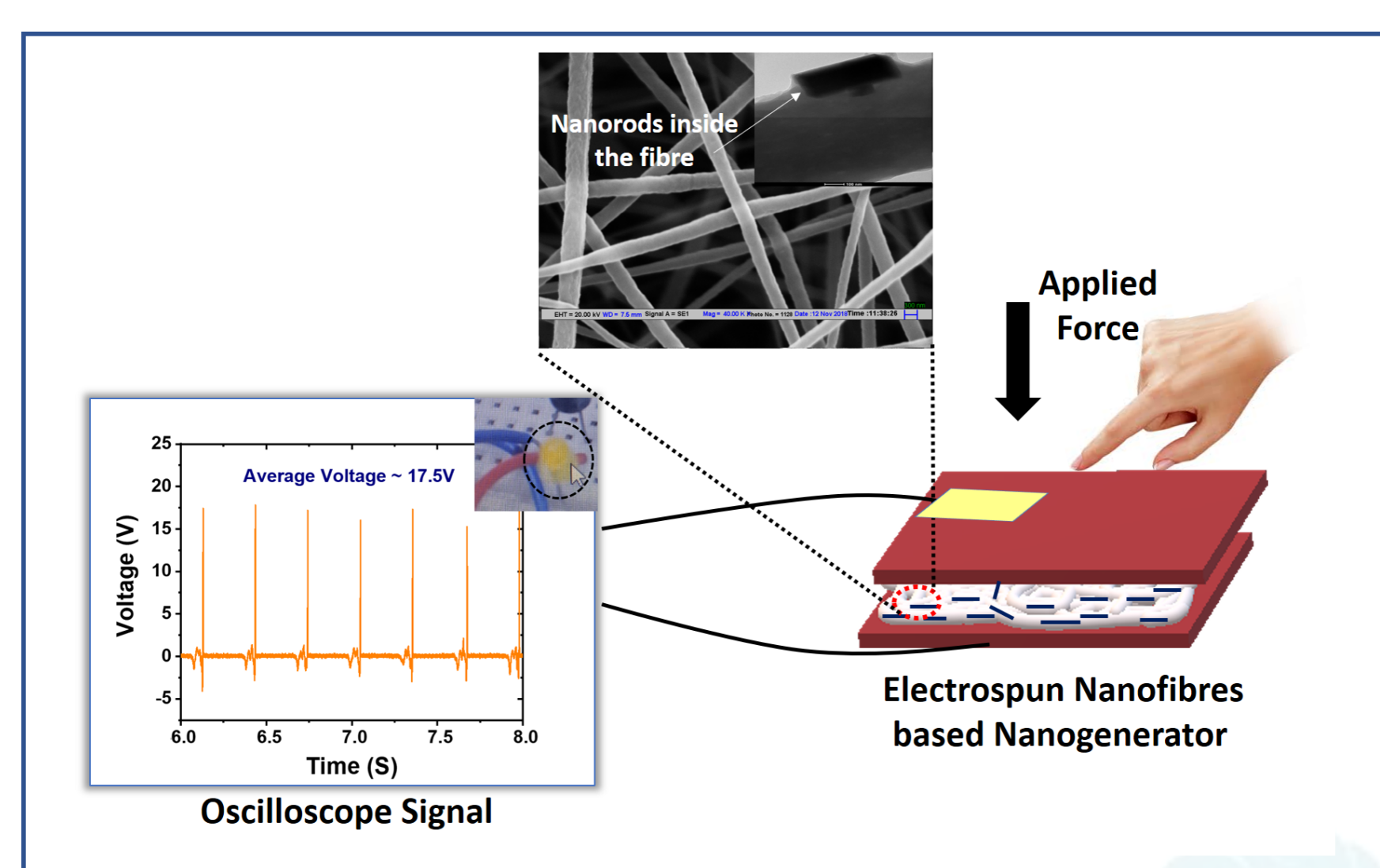
# Industry Day Theme # {Clean Energy for Sustainable Economy & Environment (CE)}



## A Sustainable Piezoelectric Nanogenerator: Conversion of Waste Mechanical Energy into Useful Electrical Energy

Satyanarjan Bairagi, Anupam Chowdhury and S. Wazed Ali<sup>#</sup>

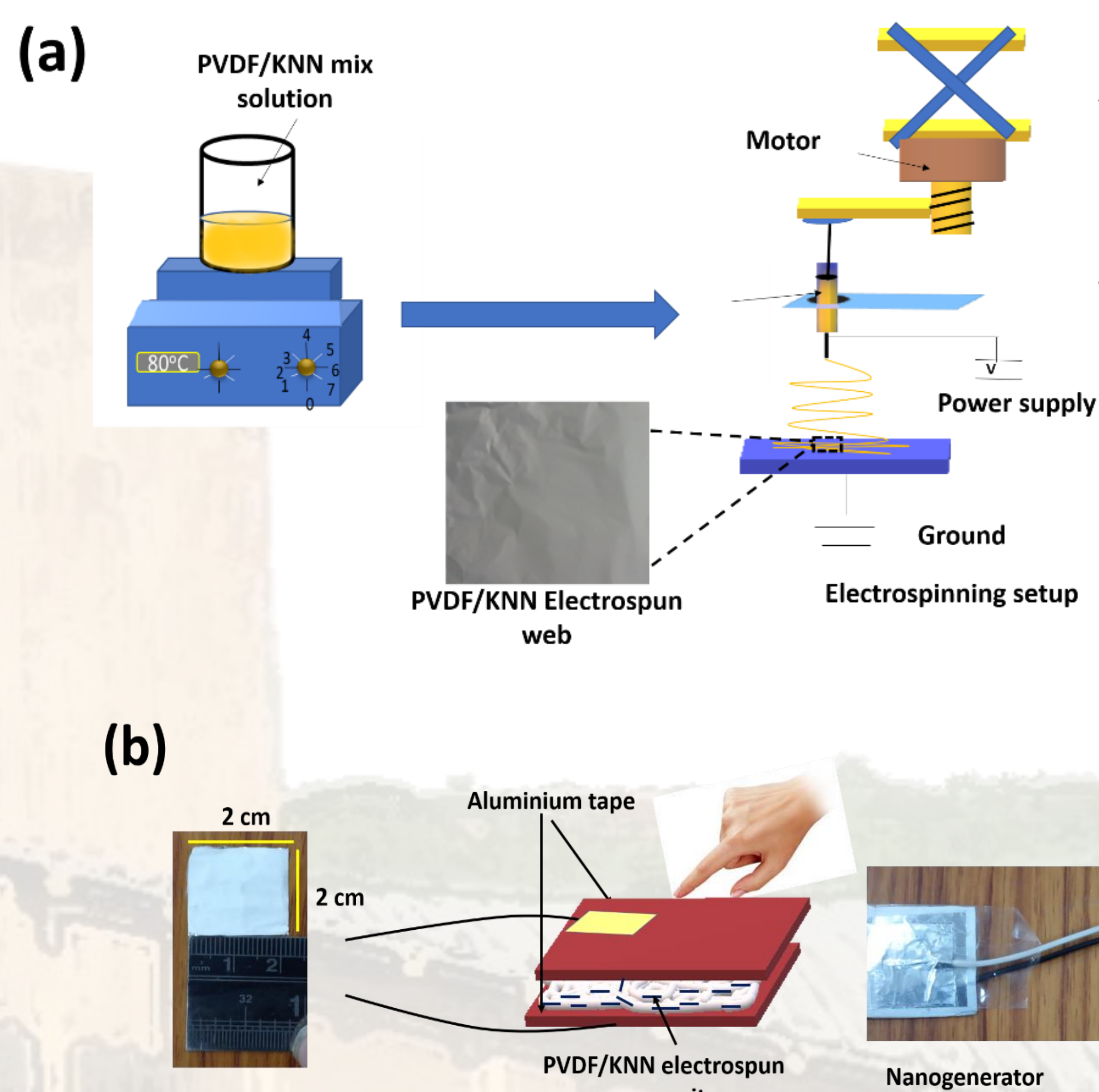
### Abstract:



### Introduction:

- Piezoelectric energy harvesting is a unique technique to convert waste mechanical energy into usable electrical energy
- Currently available commercial piezoelectric materials are ceramic based PZT (lead based) and polymer based PVDF (not efficient)
- Here, a unique lead free nanocomposite based piezoelectric materials have been demonstrated which could significantly generate high voltage to power low voltage electronic gadgets
- Is it a technology for replacement of conventional battery?

### Materials and Methods:



### Conclusions:

- ✓ A lead free filler based piezoelectric nanogenerator has been developed successfully
- ✓ The PVDF/3%KNN based electrospun piezoelectric nanogenerator shows the output voltage  $\sim 17.5V$  and output current  $\sim 0.455\mu A$ , respectively
- ✓ Applicability of the newly developed material has been illustrated by lighting a LED

### Industrial Significance:

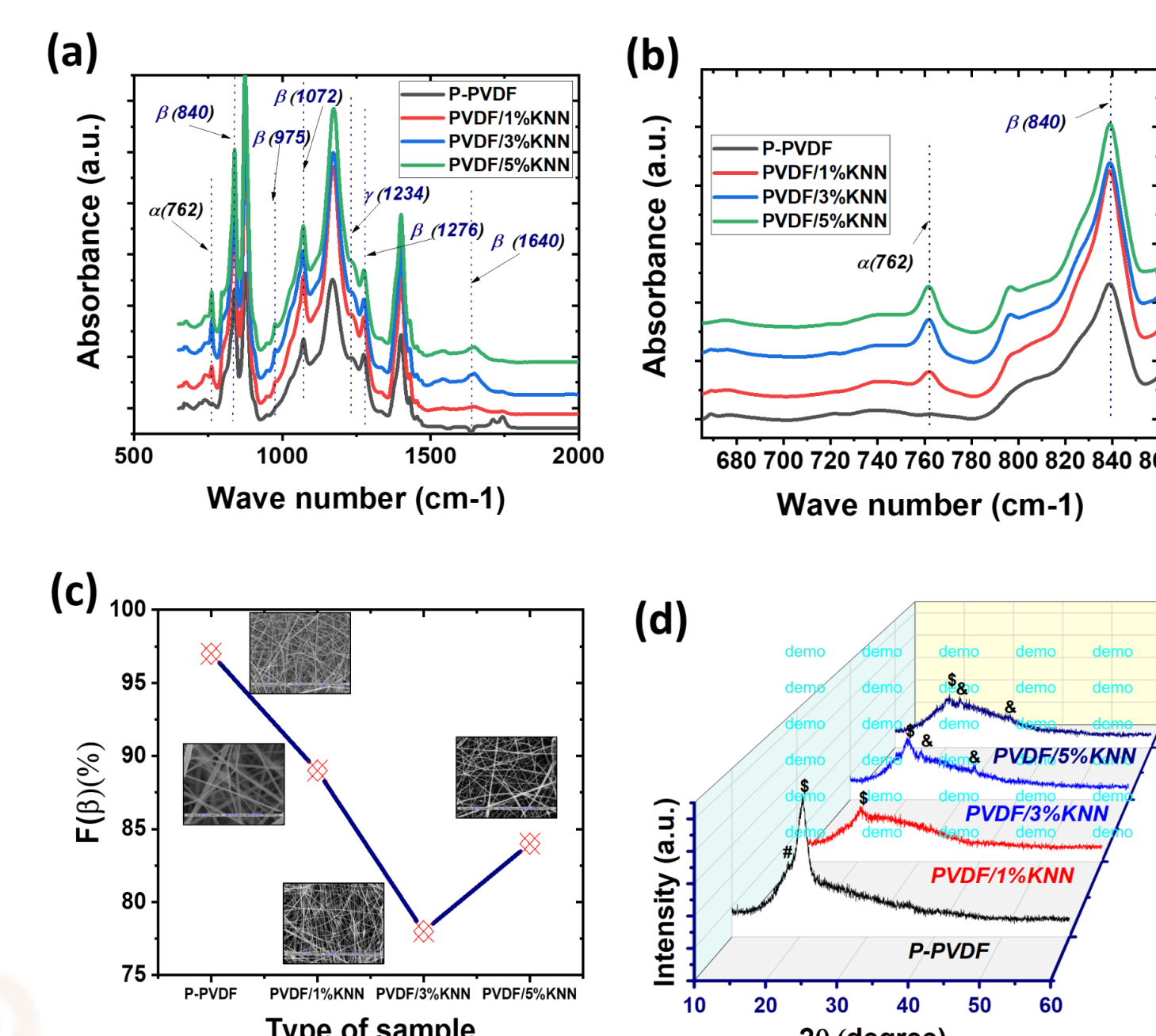
A new lead-free piezoelectric nanogenerator to replace conventional battery: solution for self-powered electronic device.

### Technology Readiness Level:

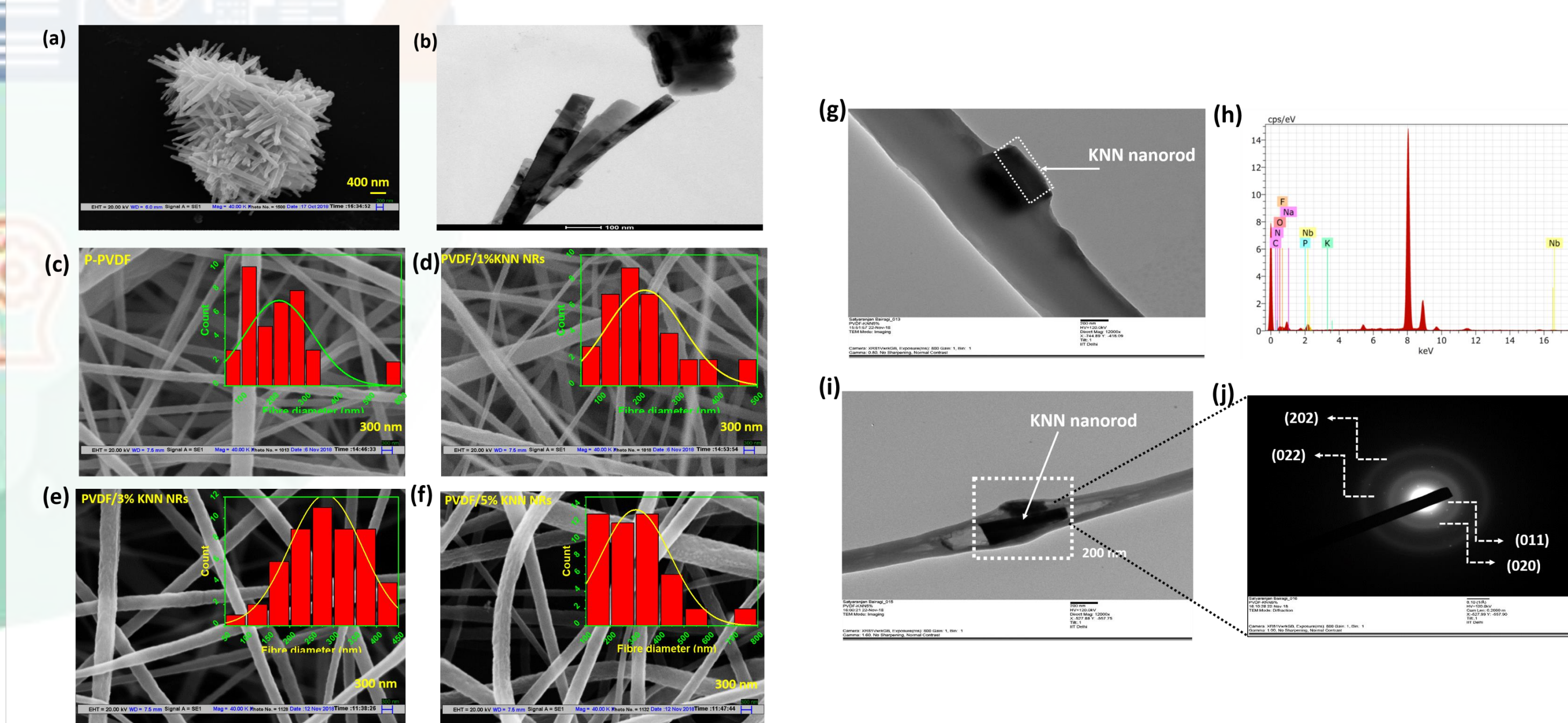
Successfully demonstrated in the Lab. Looking forward to industrial collaboration for taking scale-up trial to investigate practical applicability of the device.

### Results:

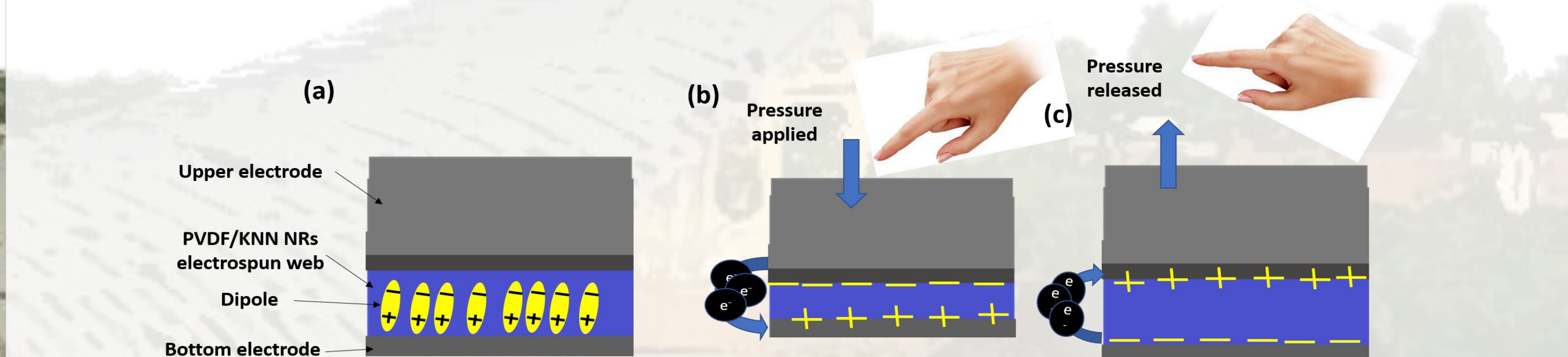
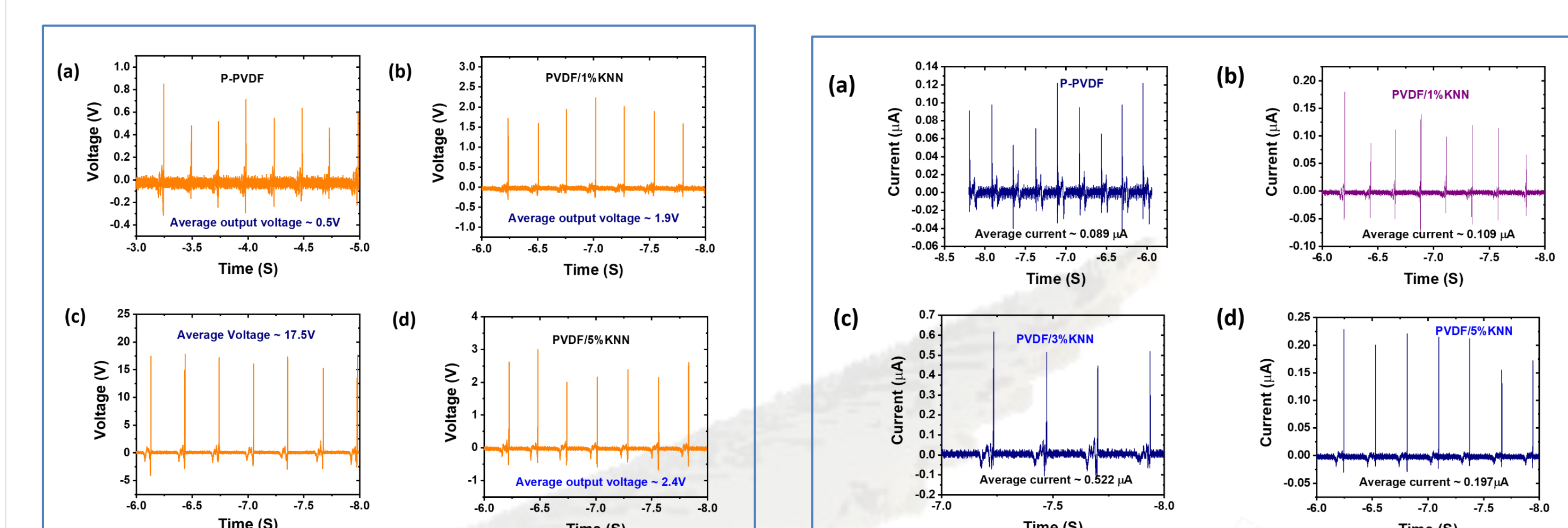
#### Analysis of the material's microstructure:



#### Morphology analysis of the material:



#### Evaluation of energy harvesting performance:



### References:

1. S. Garain, S. Jana, T. K. Sinha, D. Mandal, ACS Appl. Mater. Interfaces 2016, 8, 4532.
2. A. Teka, S. Bairagi, M. Shahadat, M. Joshi, S. Ziauddin Ahammad, S. Wazed Ali, Polym. Adv. Technol. 2018, 29, 2537.
3. S. Bairagi, S. W. Ali, Eur. Polym. J. 2019, 116, 554.

### Acknowledgement:

The authors are grateful to Science and Engineering Research Board (SERB), Govt. of India for financial assistance (File No. YSS/2014/000964) for this research work and IIT Delhi for providing the facilities.