References:

1. Key World Energy Statistics, International Energy Agency (IEA), (2020). Archived from the original on 19 may 2022
2. R. Garcia, C. Pizarro, A. G. Lavin, and J. L. Bueno, "Characterization of Spanish biomass wastes for energy use," *Bioresource Technology*, 103 (2012) 249–258.
3. C. Wan, and C.R. Bowen, "Multiscale-structuring of polyvinylidene fluoride for energy harvesting: the impact of molecular-, micro-and macro-structure," *Journal of Materials Chemistry A*, (7), 5 (2017) 3091-3128.
4. K. A. Cook-Chennault, N. Thambi, and A. M. Sastry, "Powering MEMS portable devicesa review of non-regenerative and regenerative power supply systems with special emphasis on piezoelectric energy harvesting systems," *Smart Materials and Structures*, 17 (2008) 043001
5. J.P. Thomas, M.A. Qidwai, and J.C. Kellogg, "Energy scavenging for small-scale unmanned systems," *Journal of Power Sources*, 159 (2006) 1494-1509.
6. J.A. Paradiso and T. Starner, "Energy scavenging for mobile and wireless electronics," *IEEE Pervasive Computing*, (1), 4 (2005) 18–27.
7. Z. Yang, S. Zhou, J. Zu, D. Inman, High-Performance Piezoelectric Energy Harvesters and Their Applications, *Joule*, 2 (2018) 642–697.
8. S. Roundy, P.K. Wright, J. Rabaey, A study of low level vibrations as a power source for wireless sensor nodes, *Computer Communication*, 26 (2003) 1131–1144.
9. S. Priya, H.C. Song, Y. Zhou, R. Varghese, A. Chopra, S.G. Kim, I. Kanno, L. Wu, D.S. Ha, J. Ryu, R.G. Polcawich, "A Review on Piezoelectric Energy Harvesting: Materials, Methods, and Circuits," *Energy Harvesting and Systems*, 4 (2019) 3–39.

10. D. Shen, “Piezoelectric energy harvesting devices for low frequency vibration applications,” Thesis, Auburn University 2009.
11. P.D. Mitcheson, P. Miao, B.H. Stark, E.M. Yeatman, A.S. Holmes, T.C. Green, “MEMS electrostatic micropower generator for low frequency operation,” *Sensors Actuators A Physical*, 115 (2004) 523–529.
12. P. Glynne-Jones, M.J. Tudor, S.P. Beeby, N.M. White, “An electromagnetic, vibration-powered generator for intelligent sensor systems,” *Sensors Actuators A: Phys*ical, 110 (2004) 344–349.
13. F. Qian, T.-B. Xu, L. Zuo, R. Ahmed, F. Mir, S. Banerjee, P. Sirigireddy, P. Braineard, R. Kakihara, K. Kariya, Y. Matsushita, T. Yoshimura, N. Fujimura, “Investigation of piezoelectric energy harvesting from human walking,” *Journal of Physics: Conference Series*, 1052 (2018) 012113.
14. Z. Lin, J. Chen, X. Li, Z. Zhou, K. Meng, W. Wei, J. Yang, Z.L. Wang, “Triboelectric Nanogenerator Enabled Body Sensor Network for Self-Powered Human Heart-Rate Monitoring,” *ACS Nano*, 11 (2017) 8830–8837.
15. R.T. Aljadiri, L.Y. Taha, and P. Ivey, "Electrostatic energy harvesting systems: a better understanding of their sustainability," *Journal of Clean Energy Technologies* (5), 5 (2017), 409-416.
16. S.P. Beeby, T. O’Donnell, “Electromagnetic Energy Harvesting,” *Energy Harvesting Technologies*, (2009) 129–161.
17. C. Covaci, A. Gontean, “Piezoelectric Energy Harvesting Solutions: A Review,” *Sensors*, 20 (2020) 3512.
18. Salman Khalid, Izaz Raouf, Asif Khan, Nayeon Kim, and Heung Soo Kim. "A

review of human-powered energy harvesting for smart electronics: recent progress and challenges." *International Journal of Precision Engineering and Manufacturing-Green Technology* (4), 6 (2019), 821-851.

19. J. Ghazanfarian, M.M. Mohammadi, K. Uchino, "Piezoelectric Energy Harvesting: A Systematic Review of Reviews," *Actuators*, 10 (2021) 312.
20. C. Tong, "Emerging Materials for Energy Harvesting." *Introduction to Materials for Advanced Energy Systems*, (2019) 719-817.
21. A.K. Batra, A. Alomari, A.K. Chilvery, A. Bandyopadhyay, K. Grover, "Piezoelectric power harvesting devices: An overview." *Advanced Science, Engineering and Medicine* 8, (2016), 1-12.
22. W. Wang, Y. Jiang, P.J. Thomas, "Structural Design and Physical Mechanism of Axial and Radial Sandwich Resonators with Piezoelectric Ceramics: A Review," *Sensors*, 21, (2021), 1112.
23. Zohreh Alaei, "Power Enhancement in Piezoelectric Energy Harvesting." (2016).
24. C. Baur, D.J. Apo, D. Maurya, S. Priya, W. Voit, "Advances in piezoelectric polymer composites for vibrational energy harvesting." Polymer composites for energy harvesting, conversion, and storage, *American Chemical Society*, 1161 (2014), 1-27.
25. H. Li, C. Tian, Z.D. Deng, "Energy harvesting from low frequency applications using piezoelectric materials," Applied Physics Reviews, 1 (2014), 041301.
26. M.A. Karami, O. Bilgen, D.J. Inman, M.I. Friswell, "Experimental and analytical parametric study of single-crystal unimorph beams for vibration energy harvesting," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, 58

(2011) 1508–1520.

27. S.R. Anton, H.A. Sodano, "A review of power harvesting using piezoelectric materials (2003–2006)." *Smart materials and Structures*, 16 (2007): R1
28. N. Setter, D. Damjanovic, L. Eng, G. Fox, S. Gevorgian, S. Hong, A. Kingon, H. Kohlstedt, N.Y. Park, G.B. Stephenson, I. Stolitchnov, A.K. Taganstev, D. V. Taylor, T. Yamada, S. Streiffer, “Ferroelectric thin films: Review of materials, properties, and applications,” *Journal of Applied Physics*, 100 (2006) 051606.
29. C.R. Bowen, H.A. Kim, P.M. Weaver, S. Dunn, “Piezoelectric and ferroelectric materials and structures for energy harvesting applications,” *Energy & Environmental Science*, 7 (2014) 25–44.
30. B. Ameduri, “From vinylidene fluoride (VDF) to the applications of VDF-Containing polymers and copolymers: Recent developments and future trends,” Chemical Reviews, 109 (2009), 6632–6686.
31. L. Wu, Z. Jin, Y. Liu, H. Ning, X. Liu, Alamusi, N. Hu, “Recent advances in the preparation of PVDF-based piezoelectric materials,” *Nanotechnology Reviews*, 11 (2022) 1386–1407.
32. G. Kalimuldina, N. Turdakyn, I. Abay, A. Medeubayev, A. Nurpeissova, D. Adair, Z. Bakenov, “A Review of Piezoelectric PVDF Film by Electrospinning and Its Applications,” *Sensors*, 20 (2020) 5214.
33. https://www.fluorotherm.com/technical-information/materials-overview/pvdf-properties/ (accessed May 30, 2022).
34. Y. Abe, M. Kakizaki, T. Hideshima, “The Piezoelectricity of Poly (vinylidene Fluoride),” *Japanese Journal of Applied Physics*, 8 (1969) 975.

35. P. Martins, A.C. Lopes, S. Lanceros-Mendez, “Electroactive phases of poly(vinylidene fluoride): Determination, processing and applications,” *Progress in Polymer Science*, 39 (2014) 683–706.

36. S. Sukumaran, S. Chatbouri, D. Rouxel, E. Tisserand, F. Thiebaud, T. Ben Zineb, “Recent advances in flexible PVDF based piezoelectric polymer devices for energy harvesting applications,” *Journal of Intelligent Material Systems and Structures*, 32 (2020) 746–780.

37. Y. Xin, J. Zhu, H. Sun, Y. Xu, T. Liu, C. Qian, “A brief review on piezoelectric PVDF nanofibers prepared by electrospinning,” *Ferroelectrics,* 526 (2018) 140–151.

38. Z. Li, C. Wang, “Effects of Working Parameters on Electrospinning,” *One-dimensional nanostructures*, (2013) 15–28.

39. P. Costa, J. Nunes-Pereira, N. Pereira, N. Castro, S. Gonçalves, S. Lanceros-Mendez, “Recent Progress on Piezoelectric, Pyroelectric, and Magnetoelectric Polymer-Based Energy-Harvesting Devices,” *Energy Technology*, 7 (2019) 1–19.

40. V. Sencadas, R. Gregorio, S. Lanceros-Méndez, “α to β phase transformation and microestructural changes of PVDF films induced by uniaxial stretch,” *Journal of Macromolecular Science, Part B Physics*, 48 (2009) 514–525.

41. Z. Jin, D. Lei, Y. Wang, L. Wu, N. Hu, “Influences of poling temperature and elongation ratio on PVDF-HFP piezoelectric films,” *Nanotechnology Reviews*, 10 (2021) 1009–1017.

42. I.O. Pariy, A.A. Ivanova, V. V. Shvartsman, D.C. Lupascu, G.B. Sukhorukov, M.A. Surmeneva, R.A. Surmenev, “Poling and annealing of piezoelectric

Poly(Vinylidene fluoride) micropillar arrays," *Materials Chemistry and Physics*, 239 (2020) 122035.

43. K.P. Matabola, R.M. Moutloali, "The influence of electrospinning parameters on the morphology and diameter of poly(vinyledene fluoride) nanofibers- Effect of sodium chloride," *Journal of Materials Science*, 48 (2013) 5475–5482.
44. H. Jiyong, Z. Yinda, Z. Hele, G. Yuanyuan, Y. Xudong, "Mixed effect of main electrospinning parameters on the β-phase crystallinity of electrospun PVDF nanofibers," *Smart Materials and Structures*, 26 (2017) 085019.
45. V. Tiwari, G. Srivastava, "Structural, dielectric and piezoelectric properties of 0–3 PZT/PVDF composites," *Ceramics International*, 41 (2015) 8008–8013.
46. A. Jain, S.J. Kumar, M.R. Kumar, A.S. Ganesh, S. Srikanth, "PVDF-PZT composite films for transducer applications." *Mechanics of advanced materials and structures*, 21 (2013) 181–186.
47. F. Mokhtari, M. Shamshirsaz, M. Latifi, "Investigation of β phase formation in piezoelectric response of electrospun polyvinylidene fluoride nanofibers: LiCl additive and increasing fibers tension," *Polymer Engineering & Science*, 56 (2016) 61–70.
48. C. Xing, J. Guan, Y. Li, J. Li, "Effect of a room-temperature ionic liquid on the structure and properties of electrospun poly(vinylidene fluoride) nanofibers," ACS Applied Materials & Interfaces, 6 (2014) 4447–4457.
49. C.M. Wu, M.H. Chou, W.Y. Zeng, "Piezoelectric response of aligned electrospun polyvinylidene fluoride/carbon nanotube nanofibrous membranes," *Nanomaterials*, 8 (2018) 1–13.

50. S.K. Karan, D. Mandal, B.B. Khatua, "Self-powered flexible Fe-doped RGO/PVDF nanocomposite: An excellent material for a piezoelectric energy harvester," *Nanoscale,* 7 (2015) 10655–10666.

51. R. Neppalli, S. Wanjale, M. Birajdar, V. Causin, "The effect of clay and of electrospinning on the polymorphism, structure and morphology of poly(vinylidene fluoride)," *European Polymer Journal*, 49 (2013) 90–99.

52. C. Lee, D. Wood, D. Edmondson, D. Yao, A.E. Erickson, C.T. Tsao, R.A. Revia, H. Kim, M. Zhang, "Electrospun uniaxially-aligned composite nanofibers as highly-efficient piezoelectric material," *Ceramics International*, 42 (2016) 2734–2740.

53. S.K. Si, S.K. Karan, S. Paria, A. Maitra, A.K. Das, R. Bera, A. Bera, L. Halder, B.B. Khatua, "A strategy to develop an efficient piezoelectric nanogenerator through ZTO assisted γ-phase nucleation of PVDF in ZTO/PVDF nanocomposite for harvesting bio-mechanical energy and energy storage application," *Materials Chemistry and Physics*, 213 (2018) 525–537.

54. J. Zhang, Z. Zhang, Q. Li, al -, A. Yu Tsivadze, O.E. Aksyutin, A.G. Ishkov, J.-S. Yeo, S.-M. Jang, S. Jana, S. Garain, S. Kumar Ghosh, S. Sen, D. Mandal, "The preparation of γ-crystalline non-electrically poled photoluminescant ZnO–PVDF nanocomposite film for wearable nanogenerators," *Nanotechnology*, 27 (2016) 445403.

55. S. Bairagi, S.W. Ali, "A unique piezoelectric nanogenerator composed of melt-spun PVDF/KNN nanorod-based nanocomposite fibre," *European Polymer Journal,* 116 (2019) 554–561.

56. W. Rahman, S.K. Ghosh, T.R. Middya, D. Mandal, "Highly durable piezo-electric

energy harvester by a super toughened and flexible nanocomposite: effect of laponite nano-clay in poly(vinylidene fluoride)," *Materials Research Express*, 4 (2017) 095305.

57. H. Yu, T. Huang, M. Lu, M. Mao, Q. Zhang, H. Wang, "Enhanced power output of an electrospun PVDF/MWCNTs-based nanogenerator by tuning its conductivity," *Nanotechnology*, 24 (2013), 405401.
58. K. Maity, B. Mahanty, T.K. Sinha, S. Garain, A. Biswas, S.K. Ghosh, S. Manna, S.K. Ray, D. Mandal, "Two-Dimensional Piezoelectric MoS_2-Modulated Nanogenerator and Nanosensor Made of Poly(vinlydine Fluoride) Nanofiber Webs for Self-Powered Electronics and Robotics," *Energy Technology*, 5 (2017) 234–243.
59. T. Huang, S. Yang, P. He, J. Sun, S. Zhang, D. Li, Y. Meng, J. Zhou, H. Tang, J. Liang, G. Ding, X. Xie, "Phase-Separation-Induced PVDF/Graphene Coating on Fabrics toward Flexible Piezoelectric Sensors," *ACS Applied Materials Interfaces*, 10 (2018) 30732–30740.
60. S.K. Karan, R. Bera, S. Paria, A.K. Das, S. Maiti, A. Maitra, B.B. Khatua, "An Approach to Design Highly Durable Piezoelectric Nanogenerator Based on Self-Poled PVDF/AlO-rGO Flexible Nanocomposite with High Power Density and Energy Conversion Efficiency," *Advanced Energy Materials*, 6 (2016) 1601016.
61. S. Maiti, S. Kumar Karan, J. Lee, A. Kumar Mishra, B. Bhusan Khatua, J. Kon Kim, "Bio-waste onion skin as an innovative nature-driven piezoelectric material with high energy conversion efficiency," *Nano Energy*. 42 (2017) 282–293.
62. Q.M. Saqib, M.U. Khan, H. Song, M.Y. Chougale, R.A. Shaukat, J. Kim, J. Bae, M.J. Choi, S.C. Kim, O. Kwon, A. Bermak, "Natural Hierarchically Structured

Highly Porous Tomato Peel Based Tribo- and Piezo-Electric Nanogenerator for Efficient Energy Harvesting," *Advanced Sustainable Systems*, 5 (2021).

63. A. Tamang, S.K. Ghosh, S. Garain, M.M. Alam, J. Haeberle, K. Henkel, D. Schmeisser, D. Mandal, "DNA-Assisted β-phase Nucleation and Alignment of Molecular Dipoles in PVDF Film: A Realization of Self-Poled Bioinspired Flexible Polymer Nanogenerator for Portable Electronic Devices," *ACS Applied Materials Interfaces*, 7 (2015) 16143–16147.
64. H. Pei, S. Shi, Y. Chen, Y. Xiong, Q. Lv, "Combining Solid-State Shear Milling and FFF 3D-Printing Strategy to Fabricate High-Performance Biomimetic Wearable Fish-Scale PVDF-Based Piezoelectric Energy Harvesters," *ACS Applied Materials Interfaces*, 14 (2022) 15346–15359.
65. S. Garain, S. Jana, T.K. Sinha, D. Mandal, "Design of In Situ Poled Ce^{3+}-Doped Electrospun PVDF/Graphene Composite Nanofibers for Fabrication of Nanopressure Sensor and Ultrasensitive Acoustic Nanogenerator," *ACS Applied Materials Interfaces*, 8 (2016) 4532–4540.
66. Y. Xin, X. Qi, H. Tian, C. Guo, X. Li, J. Lin, C. Wang, "Full-fiber piezoelectric sensor by straight PVDF/nanoclay nanofibers," *Materials Letters*, 164 (2016) 136–139.
67. M.M. Abolhasani, K. Shirvanimoghaddam, M. Naebe, "PVDF/graphene composite nanofibers with enhanced piezoelectric performance for development of robust nanogenerators," *Composites Science and Technology*, 138 (2017) 49–56.
68. Y. Zhao, Q. Liao, G. Zhang, Z. Zhang, Q. Liang, X. Liao, Y. Zhang, "High output piezoelectric nanocomposite generators composed of oriented BaTiO3

NPs@PVDF," *Nano Energy*. 11 (2015) 719–727.

69. S. Siddiqui, D. Il Kim, E. Roh, L.T. Duy, T.Q. Trung, M.T. Nguyen, N.E. Lee, "A durable and stable piezoelectric nanogenerator with nanocomposite nanofibers embedded in an elastomer under high loading for a self-powered sensor system," *Nano Energy*, 30 (2016) 434–442.
70. D. Singh, A. Choudhary, A. Garg, "Flexible and Robust Piezoelectric Polymer Nanocomposites Based Energy Harvesters," *ACS Applied Materials Interfaces*, 10 (2018) 2793–2800.
71. R. Fu, S. Chen, Y. Lin, S. Zhang, J. Jiang, Q. Li, Y. Gu, "Improved piezoelectric properties of electrospun poly(vinylidene fluoride) fibers blended with cellulose nanocrystals," *Materials Letters*, 187 (2017) 86–88.
72. S.K. Karan, S. Maiti, S. Paria, A. Maitra, S.K. Si, J.K. Kim, B.B. Khatua, "A new insight towards eggshell membrane as high energy conversion efficient bio-piezoelectric energy harvester," *Materials Today Energy*, 9 (2018) 114–125.
73. S.K. Karan, S. Maiti, O. Kwon, S. Paria, A. Maitra, S.K. Si, Y. Kim, J.K. Kim, B.B. Khatua, "Nature driven spider silk as high energy conversion efficient bio-piezoelectric nanogenerator," *Nano Energy*, 49 (2018) 655–666.
74. W. Deng, T. Yang, L. Jin, C. Yan, H. Huang, X. Chu, Z. Wang, D. Xiong, G. Tian, Y. Gao, H. Zhang, W. Yang, "Cowpea-structured PVDF/ZnO nanofibers based flexible self-powered piezoelectric bending motion sensor towards remote control of gestures," *Nano Energy*, 55 (2019) 516–525.
75. Y.R. Wang, J.M. Zheng, G.Y. Ren, P.H. Zhang, C. Xu, "A flexible piezoelectric force sensor based on PVDF fabrics," *Smart Materials and Structures*, 20 (2011)

045009.

76. X. Yang, Y. Wang, X. Qing, “A flexible capacitive sensor based on the electrospun PVDF nanofiber membrane with carbon nanotubes,” *Sensors and Actuators A: Physical*, 299 (2019) 111579.
77. J.M. Corres, Y.R. Garcia, F.J. Arregui, I.R. Matias, “Optical fiber humidity sensors using PVdF electrospun nanowebs,” *IEEE Sensors Journal*, 11 (2011) 2383–2387.
78. L.B. Kong, T. Li, H.H. Hng, F. Boey, T. Zhang, S. Li, “Waste Thermal Energy Harvesting (I): Thermoelectric Effect,” *Lect. Notes Energy*, 24 (2014) 263–403.
79. H. Li, C. Tian, Z.D. Deng, “Energy harvesting from low frequency applications using piezoelectric materials,” *Applied Physics Review*, 1 (2014) 041301.
80. Z.L. Wang, J. Song, “Piezoelectric nanogenerators based on zinc oxide nanowire arrays,” *Science*, 312 (2006) 242–246.
81. Y. Qin, X. Wang, Z.L. Wang, “Microfibre-nanowire hybrid structure for energy scavenging,” *Nature*, 451 (2008) 809–813.
82. O. Prakash, S. Bihari, Keshav, S. Tiwari, R. Prakash, P. Maiti, “Dehydrohalogenated poly(vinylidene fluoride)-based anion exchange membranes for fuel cell applications,” *Materials Today Chemistry*, 23 (2022) 100640.
83. H. Fu, Y. Li, J. Yu, Z. Wu, Q. Fan, F. Lin, H.Y. Woo, F. Gao, Z. Zhu, A.K.Y. Jen, “High efficiency (15.8%) all-polymer solar cells enabled by a regioregular narrow bandgap polymer acceptor,” *Journal of the American Chemical Society*, 143 (2021) 2665–2670.

84. V.K. Tiwari, Z. Chen, F. Gao, Z. Gu, X. Sun, Z. Ye, "Synthesis of ultra-small carbon nanospheres (<50 nm) with uniform tunable sizes by a convenient catalytic emulsion polymerization strategy: superior supercapacitive and sorption performance," *Journal of Materials Chemistry A*, 5 (2017) 12131–12143.

85. S. Wang, Z. Lin Wang, Y. Yang, S. Wang, Z.L. Wang, Y. Yang, "A One-Structure-Based Hybridized Nanogenerator for Scavenging Mechanical and Thermal Energies by Triboelectric–Piezoelectric–Pyroelectric Effects," *Advanced Materials*, 28 (2016) 2881–2887.

86. J. Wang, S. Li, F. Yi, Y. Zi, J. Lin, X. Wang, Y. Xu, Z.L. Wang, "Sustainably powering wearable electronics solely by biomechanical energy," Nature communications, 7 (2016) 1-8.

87. F. Yi, X. Wang, S. Niu, S. Li, Y. Yin, K. Dai, G. Zhang, L. Lin, Z. Wen, H. Guo, J. Wang, M.H. Yeh, Y. Zi, Q. Liao, Z. You, Y. Zhang, Z.L. Wang, "A highly shape-adaptive, stretchable design based on conductive liquid for energy harvesting and self-powered biomechanical monitoring," *Science Advances*, 2 (2016) e1501624.

88. S.P. Beeby, M.J. Tudor, N.M. White, "Energy harvesting vibration sources for microsystems applications," *Measurement science and technology*, 17 (2006) R175.

89. Q. Xu, X. Gao, S. Zhao, Y.-N. Liu, D. Zhang, K. Zhou, H. Khanbareh, W. Chen, Y. Zhang, C. Bowen, Q. Xu, X. Gao, S. Zhao, Y.-N. Liu, W. Chen, D. Zhang, Y. Zhang, K. Zhou, H. Khanbareh, C. Bowen, "Construction of Bio-Piezoelectric Platforms: From Structures and Synthesis to Applications," *Advanced Materials*, 33 (2021) 2008452.

90. K.S. Ramadan, D. Sameoto, S. Evoy, "A review of piezoelectric polymers as functional materials for electromechanical transducers," *Smart Materials and Structures*, 23 (2014) 033001.

91. S. Mishra, L. Unnikrishnan, S.K. Nayak, S. Mohanty, "Advances in Piezoelectric Polymer Composites for Energy Harvesting Applications: A Systematic Review, *Macromolecular Materials and Engineering*," 304 (2019) 1–25.

92. L. Li, M. Zhang, M. Rong, W. Ruan, "Studies on the transformation process of PVDF from α to β phase by stretching," *RSC Advances*, 4 (2014) 3938–3943.

93. V.K. Tiwari, A.K. Prasad, V. Singh, K.K. Jana, M. Misra, C.D. Prasad, P. Maiti, "Nanoparticle and process induced super toughened piezoelectric hybrid materials: The effect of stretching on filled system," *Macromolecules.* 46 (2013) 5595–5603.

94. Y. Xin, J. Zhu, H. Sun, Y. Xu, T. Liu, C. Qian, "A brief review on piezoelectric PVDF nanofibers prepared by electrospinning," *Ferroelectrics*, 526 (2018) 140–151.

95. S. Tiwari, A. Gaur, C. Kumar, P. Maiti, "Enhanced piezoelectric response in nanoclay induced electrospun PVDF nanofibers for energy harvesting," *Energy*, 171 (2019) 485–492.

96. A. Gaur, S. Tiwari, C. Kumar, P. Maiti, Flexible, "Lead-Free Nanogenerators Using Poly(vinylidene fluoride) Nanocomposites," *Energy & Fuels*, 34 (2020) 6239–6244.

97. S.H. Wankhade, S. Tiwari, A. Gaur, P. Maiti, "PVDF–PZT nanohybrid based

nanogenerator for energy harvesting applications," *Energy Reports*, 6 (2020) 358–364.

98. A. Gaur, C. Kumar, S. Tiwari, P. Maiti, "Efficient Energy Harvesting Using Processed Poly(vinylidene fluoride) Nanogenerator," *ACS Applied Energy Materials*, 1 (2018) 3019–3024.

99. R. Mejri, J.C. Dias, S.B. Hentati, M.S. Martins, C.M. Costa, S. Lanceros-Mendez, "Effect of anion type in the performance of ionic liquid/poly(vinylidene fluoride) electromechanical actuators," *Journal of Non-Crystalline Solids*, 453 (2016) 8–15.

100. S. Tiwari, A. Gaur, C. Kumar, P. Maiti, "Ionic Liquid-Based Electrospun Polymer Nanohybrid for Energy Harvesting," *ACS Applied Electronic Materials*, 3 (2021) 2738–2747.

101. A. Gaur, C. Kumar, R. Shukla, P. Maiti, "Induced Piezoelectricity in Poly(vinylidene fluoride) Hybrid as Efficient Energy Harvester," *ChemistrySelect*, 2 (2017) 8278–8287.

102. O. Prakash, K.K. Jana, M. Manohar, V.K. Shahi, S.A. Khan, D. Avasthi, P. Maiti, "Fabrication of a low-cost functionalized poly(vinylidene fluoride) nanohybrid membrane for superior fuel cells," *Sustainable Energy & Fuels*, 3 (2019) 1269–1282.

103. J.Z. Xu, G.J. Zhong, B.S. Hsiao, Q. Fu, Z.M. Li, "Low-dimensional carbonaceous nanofiller induced polymer crystallization," *Progress in Polymer Science*, 39 (2014) 555–593.

104. R. Bhunia, R. Dey, S. Das, S. Hussain, R. Bhar, A. Kumar Pal, "Enhanced piezo-electric property induced in graphene oxide/polyvinylidene fluoride composite flexible thin films," *Polymer Composites*, 39 (2018) 4205–4216.

105. S. Yoon, A.A. Prabu, K.J. Kim, C. Park, "Metal salt-induced ferroelectric crystalline phase in poly(vinylidene fluoride) films," *Macromolecular Rapid Communications*, 29 (2008) 1316–1321.

106. C. Kumar, A. Gaur, S. Tiwari, A. Biswas, S.K. Rai, P. Maiti, "Bio-waste polymer hybrid as induced piezoelectric material with high energy harvesting efficiency," *Composites Communications*, 11 (2019) 56–61.

107. A. Gaur, S. Tiwari, C. Kumar, P. Maiti, "Polymer Biowaste Hybrid for Enhanced Piezoelectric Energy Harvesting," *ACS Applied Electronic Materials*, 2 (2020) 1426–1432.

108. A. Gaur, S. Tiwari, C. Kumar, P. Maiti, "Bio-waste orange peel and polymer hybrid for efficient energy harvesting," *Energy Reports*, 6 (2020) 490–496.

109. Y. Song, Z. Shi, G.H. Hu, C. Xiong, A. Isogai, Q. Yang, "Recent advances in cellulose-based piezoelectric and triboelectric nanogenerators for energy harvesting: a review," *Journal of Materials Chemistry A*, 9 (2021) 1910–1937.

110. F. Ram, S. Radhakrishnan, T. Ambone, K. Shanmuganathan, "Highly Flexible Mechanical Energy Harvester Based on Nylon 11 Ferroelectric Nanocomposites," *ACS Applied Polymer Materials*, 1 (2019) 1998–2005.

111. H. Fashandi, M.M. Abolhasani, P. Sandoghdar, N. Zohdi, Q. Li, M. Naebe,

"Morphological changes towards enhancing piezoelectric properties of PVDF electrical generators using cellulose nanocrystals," *Cellulose,* 23 (2016) 3625–3637.

112. S. Barrau, A. Ferri, A. Da Costa, J. Defebvin, S. Leroy, R. Desfeux, J.M. Lefebvre, "Nanoscale Investigations of α- And γ-Crystal Phases in PVDF-Based Nanocomposites," *ACS Applied Materials Interfaces,* 10 (2018) 13092–13099.

113. C. Trilokesh, K.B. Uppuluri, "Isolation and characterization of cellulose nanocrystals from jackfruit peel," *Scientific Reports*, 9 (2019) 1–8.

114. A.C. Lopes, C.M. Costa, C.J. Tavares, I.C. Neves, S. Lanceros-Mendez, "Nucleation of the electroactive γ phase and enhancement of the optical transparency in low filler content poly(vinylidene)/clay nanocomposites," *The Journal of Physical Chemistry C*, 115 (2011) 18076–18082.

115. V. Shahedifar, A.M. Rezadoust, "Thermal and mechanical behavior of cotton/vinyl ester composites: Effects of some flame retardants and fiber treatment," *Journal of Reinforced Plastics and Composites,* 32 (2013) 681–688.

116. E. Corradini, E.M. Teixeira, P.D. Paladin, J.A. Agnelli, O.R.R.F. Silva, L.H.C. Mattoso, "Thermal stability and degradation kinetic study of white and colored cotton fibers by thermogravimetric analysis," *Journal of Thermal Analysis and Calorimetry*, 97 (2009) 415–419.

117. B. Lindman, G. Karlström, L. Stigsson, "On the mechanism of dissolution of cellulose," *Journal of Molecular Liquids*, 156 (2010) 76–81.

118. B. Medronho, A. Romano, M.G. Miguel, L. Stigsson, B. Lindman, "Rationalizing

cellulose (in)solubility: Reviewing basic physicochemical aspects and role of hydrophobic interactions," *Cellulose*, 19 (2012) 581–587.

119. S. Park, J.O. Baker, M.E. Himmel, P.A. Parilla, D.K. Johnson, "Cellulose crystallinity index: Measurement techniques and their impact on interpreting cellulase performance," *Biotechnology for biofuels,* 3 (2010) 1–10.

120. E. Elbadrawy, A. Sello, "Evaluation of nutritional value and antioxidant activity of tomato peel extracts," *Arabian Journal of Chemistry*, 9 (2016) S1010–S1018.

121. M. Knoblich, B. Anderson, D. Latshaw, "Analyses of tomato peel and seed byproducts and their use as a source of carotenoids," *Journal of the Science of Food and Agriculture,* 85 (2005) 1166–1170..

122. X. Chen, S. Xu, N. Yao, Y. Shi, "1.6 V Nanogenerator for Mechanical Energy Harvesting Using PZT Nanofibers," *Nano Letters*, 10 (2010) 2133–2137.

123. G. Zhang, Q. Liao, Z. Zhang, Q. Liang, Y. Zhao, X. Zheng, Y. Zhang, G. Zhang, Q. Liao, Z. Zhang, Q. Liang, Y. Zhao, X. Zheng, Y. Zhang, "Novel Piezoelectric Paper-Based Flexible Nanogenerators Composed of BaTiO3 Nanoparticles and Bacterial Cellulose," *Advanced Science*, 3 (2016) 1500257.

124. L. Wang, T. Cheng, W. Lian, M. Zhang, B. Lu, B. Dong, K. Tan, C. Liu, C. Shen, "Flexible layered cotton cellulose-based nanofibrous membranes for piezoelectric energy harvesting and self-powered sensing," *Carbohydrate Polymers*, 275 (2022) 118740.

125. S. Kumar Karan, R. Bera, S. Paria, A. Kumar Das, S. Maiti, A. Maitra, B. Bhusan

Khatua, S.K. Karan, R. Bera, S. Paria, A.K. Das, S. Maiti, A. Maitra, B.B. Khatua, "An Approach to Design Highly Durable Piezoelectric Nanogenerator Based on Self-Poled PVDF/AlO-rGO Flexible Nanocomposite with High Power Density and Energy Conversion Efficiency," *Advanced Energy Materials*, 6 (2016) 1601016.

126. H.S. Kim, J.H. Kim, J. Kim, "A review of piezoelectric energy harvesting based on vibration," *International Journal of Precision Engineering and Manufacturing*, 12 (2011) 1129–1141.

127. L.M. Swallow, J.K. Luo, E. Siores, I. Patel, D. Dodds, "A piezoelectric fibre composite based energy harvesting device for potential wearable applications," *Smart Materials and Structures,* 17 (2008) 025017.

128. I. Dakua, N. Afzulpurkar, "Piezoelectric Energy Generation and Harvesting at the Nano-Scale: Materials and Devices," *Nanomaterials and Nanotechnology*, 3 (2013) 21.

129. J. Granstrom, J. Feenstra, H.A. Sodano, K. Farinholt, "Energy harvesting from a backpack instrumented with piezoelectric shoulder straps," *Smart Materials and Structures,* 16 (2007) 1810–1820.

130. B.-S. Lee, B. Park, H.-S. Yang, J. Woo Han, C. Choong, J. Bae, K. Lee, W.-R. Yu, U. Jeong, U.-I. Chung, J.-J. Park, O. Kim, "Effects of Substrate on Piezoelectricity of Electrospun Poly(vinylidene fluoride)-Nanofiber-Based Energy Generators," *ACS Applied Materials Interfaces*, 6 (2014) 3520-3527.

131. N.R. Alluri, A. Chandrasekhar, J.H. Jeong, S.J. Kim, "Enhanced electroactive β-

phase of the sonication-process-derived PVDF-activated carbon composite film for efficient energy conversion and a battery-free acceleration sensor," *Journal of Materials Chemistry C,* 5 (2017) 4833–4844.

132. C. Kumar, A. Gaur, S.K. Rai, P. Maiti, "Piezo devices using poly(vinylidene fluoride)/reduced graphene oxide hybrid for energy harvesting," *Nano-Structures and Nano-Objects*, 12 (2017) 174–181.

133. P. Rahmani, S. Dadbin, M. Frounchi, "Characterization of PVDF/Nanoclay Nanocomposites Prepared by Melt, Solution, and Co-Precipitation Methods," *International Journal of Polymer Analysis and Characterization*, 17 (2012) 291–301.

134. H. Song, Fabrication and characterisation of electrospun polyvinylidene fluoride (PVDF) nanocomposites for energy harvesting applications, (2016) 0–147.**THESIS**

135. L. Yu, P. Cebe, "Crystal polymorphism in electrospun composite nanofibers of poly(vinylidene fluoride) with nanoclay," *Polymer* (*Guildf*). 50 (2009) 2133–2141.

136. A. Baji, Y.W. Mai, Q. Li, Y. Liu, "Electrospinning induced ferroelectricity in poly(vinylidene fluoride) fibers," *Nanoscale,* 3 (2011) 3068–3071.

137. Z.M. Huang, Y.Z. Zhang, M. Kotaki, S. Ramakrishna, "A review on polymer nanofibers by electrospinning and their applications in nanocomposites," *Composites Science and Technology,* 63 (2003) 2223–2253.

138. J. Chang, M. Dommer, C. Chang, L. Lin, "Piezoelectric nanofibers for energy scavenging applications," *Nano Energy*, 1 (2012) 356–371.

139. M.S. Sorayani Bafqi, R. Bagherzadeh, M. Latifi, “Fabrication of composite PVDF-ZnO nanofiber mats by electrospinning for energy scavenging application with enhanced efficiency,” *Journal of Polymer Research*, 22 (2015) 130.

140. S. Cho, J.S. Lee, J. Jang, “Enhanced Crystallinity, Dielectric, and Energy Harvesting Performances of Surface-Treated Barium Titanate Hollow Nanospheres/PVDF Nanocomposites,” *Advanced Materials Interfaces*, 2 (2015) 1–13.

141. C. Te Huang, J. Song, W.F. Lee, Y. Ding, Z. Gao, Y. Hao, L.J. Chen, Z.L. Wang, “GaN nanowire arrays for high-output nanogenerators,” *Journal of the American Chemical Society*, 132 (2010) 4766–4771.

142. M.M. Alam, S.K. Ghosh, A. Sultana, D. Mandal, “Lead-free ZnSnO3/MWCNTs-based self-poled flexible hybrid nanogenerator for piezoelectric power generation,” *Nanotechnology*, 26 (2015) 165403.

143. I. Pleşa, P. V. Noţingher, S. Schlögl, C. Sumereder, M. Muhr, “Properties of polymer composites used in high-voltage applications,” *Polymers* (*Basel*), 8 (2016) 173.

144. S. Manna, A.K. Nandi, “Piezoelectric β polymorph in poly(vinylidene fluoride)-functionalized multiwalled carbon nanotube nanocomposite films,” *The Journal of Physical Chemistry C*, 111 (2007) 14670–14680.

145. A. Al-Saygh, D. Ponnamma, M.A.A. AlMaadeed, P. Poornima Vijayan, A. Karim, M.K. Hassan, “Flexible pressure sensor based on PVDF nanocomposites containing

reduced graphene oxide-titania hybrid nanolayers," *Polymers (Basel),* 9 (2017) 33.

146. K. Yoon, A. Kelarakis, "Nanoclay-directed structure and morphology in PVDF electrospun membranes," *Journal of Nanomaterials,* (2014).

147. D. Dhakras, V. Borkar, S. Ogale, J. Jog, "Enhanced piezoresponse of electrospun PVDF mats with a touch of nickel chloride hexahydrate salt," *Nanoscale*, 4 (2012) 752–756.

148. D. Mandal, K.J. Kim, J.S. Lee, "Simple synthesis of palladium nanoparticles, β-phase formation, and the control of chain and dipole orientations in palladium-doped poly (vinylidene fluoride) thin films," *Langmuir,* 28 (2012) 10310–10317.

149. B. Li, F. Zhang, S. Guan, J. Zheng, C. Xu, "Wearable piezoelectric device assembled by one-step continuous electrospinning," *Journal of Materials Chemistry C,* 4 (2016) 6988–6995.

150. Y.L. Liu, Y. Li, J.T. Xu, Z.Q. Fan, "Cooperative effect of electrospinning and nanoclay on formation of polar crystalline phases in poly(vinylidene fluoride)," *ACS Applied Materials Interfaces*, 2 (2010) 1759–1768.

151. C.Y. Lai, A. Groth, S. Gray, M. Duke, "Enhanced abrasion resistant PVDF/nanoclay hollow fibre composite membranes for water treatment," *Journal of Membrane Science*, 449 (2013) 146–157.

152. D. Shah, P. Maiti, E. Gunn, D.F. Schmidt, D.D. Jiang, C.A. Batt, E.P. Giannelis, "Dramatic enhancements in toughness of polyvinylidene fluoride nanocomposites via nanoclay-directed crystal structure and morphology," *Advanced Materials*, 16

(2004) 1173–1177.

153. A. Gaur, R. Shukla, B. Kumar, A. Pal, S. Chatterji, R. Ranjan, P. Maiti, "Processing and nanoclay induced piezoelectricity in poly(vinylidene fluoride-co-hexafluoro propylene) nanohybrid for device application," *Polymer,* 97 (2016) 362–369.

154. C. Chang, V.H. Tran, J. Wang, Y.K. Fuh, L. Lin, "Direct-write piezoelectric polymeric nanogenerator with high energy conversion efficiency," *Nano Letters*, 10 (2010) 726–731.

155. S. Garain, T. Kumar Sinha, P. Adhikary, K. Henkel, S. Sen, S. Ram, C. Sinha, D. Schmeißer, D. Mandal, "Self-poled transparent and flexible UV light-emitting cerium complex-PVDF composite: A high-performance nanogenerator," *ACS Applied Materials Interfaces*, 7 (2015) 1298–1307.

156. D.L. Churchill, M.J. Hamel, C.P. Townsend, S.W. Arms, "Strain Energy Harvesting for Wireless Sensor Networks," *Smart Materials and Structures,* 5055 (2003) 319–327..

157. S. Li, J. Yuan, H. Lipson, "Ambient wind energy harvesting using cross-flow fluttering," *Journal of Applied Physics*, 109 (2011) 2–5.

158. A. Mandal, A.K. Nandi, "Ionic liquid integrated multiwalled carbon nanotube in a poly(vinylidene fluoride) matrix: Formation of a piezoelectric β-polymorph with significant reinforcement and conductivity improvement," *ACS Applied Materials Interfaces,* 5 (2013) 747–760.

159. Y.S. Ye, J. Rick, B.J. Hwang, "Ionic liquid polymer electrolytes," *Journal of Materials Chemistry A*, 1 (2013) 2719–2743.

160. G.A. Giffin, "Ionic liquid-based electrolytes for "beyond lithium" battery technologies," *Journal of Materials Chemistry A*, 4 (2016) 13378–13389.

161. D.M. Correia, C.M. Costa, R. Sabater i Serra, J.A. Gómez Tejedor, L. Teruel Biosca, V. de Zea Bermudez, J.M.S.S. Esperança, P.M. Reis, A. Andrio Balado, J.M. Meseguer-Dueñas, S. Lanceros-Méndez, J.L. Gomez Ribelles, "Molecular relaxation and ionic conductivity of ionic liquids confined in a poly(vinylidene fluoride) polymer matrix: Influence of anion and cation type," *Polymer* (*Guildf*). 171 (2019) 58–69.

162. K.N. Marsh, J.A. Boxall, R. Lichtenthaler, "Room temperature ionic liquids and their mixtures—a review," *Fluid Phase Equilibria*, 219 (2004) 93–98.

163. D.R. Macfarlane, N. Tachikawa, M. Forsyth, J.M. Pringle, P.C. Howlett, G.D. Elliott, J.H. Davis, M. Watanabe, P. Simon, C.A. Angell, "Energy applications of ionic liquids," *Energy & Environmental Science*, 7 (2014) 232–250.

164. C.M. Costa, M.M. Silva, S. Lanceros-Méndez, "Battery separators based on vinylidene fluoride (VDF) polymers and copolymers for lithium ion battery applications," RSC Advances, 3 (2013) 11404–11417.

165. L. Rasmussen, "Electroactivity in polymeric materials," *Springer Science & Business Media*, (2012).

166. S.A. Haddadi, S. Ghaderi, M. Amini, S.A.A. Ramazani, "Mechanical and

piezoelectric characterizations of electrospun PVDF-nanosilica fibrous scaffolds for biomedical applications," *Materials Today: Proceedings*, 5 (2018) 15710–15716.

167. L.M. Swallow, J.K. Luo, E. Siores, I. Patel, D. Dodds, "A piezoelectric fibre composite based energy harvesting device for potential wearable applications," *Smart Materials and Structures*, 17 (2008) 025017.

168. M.M. Abolhasani, K. Shirvanimoghaddam, M. Naebe, "PVDF/graphene composite nanofibers with enhanced piezoelectric performance for development of robust nanogenerators," *Composites Science and Technology*, 138 (2017) 49–56.

169. D. Correia, C. M. Costa, R. Sabater i Serra, JA Gómez Tejedor, L. Teruel Biosca, Verónica De Zea Bermúdez, J. M. S. S. Esperança, P.M. Reis, A.A. Balado, J.M. Meseguer-Dueñas, and S. Lanceros-Méndez, "Molecular relaxation and ionic conductivity of ionic liquids confined in a poly (vinylidene fluoride) polymer matrix: influence of anion and cation type" *Polymer*, 171 (2019) 58-69.

170. N. Maity, A. Mandal, A.K. Nandi, "Interface engineering of ionic liquid integrated graphene in poly(vinylidene fluoride) matrix yielding magnificent improvement in mechanical, electrical and dielectric properties," *Polymer* (*Guildf*), 65 (2015) 154–167.

171. T. Iqbal, R. Sahrash, A. Siddiqa, S. Afsheen, M.B. Tahir, M.I. Khan, K.N. Riaz, G. Nabi, M. Fahad, M. Sharif, M. Abrar, "Preparation and characterization of polyvinylidene fluoride/1-butyl-3-methylimidazolium bromide-based ionogel membranes for desalination applications," *International Journal of Environmental Science and Technology*, 16 (2019) 7081–7092.

172. O. Prakash, K.K. Jana, R. Jain, P. Shah, M. Manohar, V.K. Shahi, P. Maiti, "Functionalized poly(vinylidene fluoride-co-hexafluoro propylene) membrane for fuel cell," *Polymer* 151 (2018) 261–268.

173. R. Mejri, J.C. Dias, S. Besbes Hentati, M.S. Martins, C.M. Costa, S. Lanceros-Mendez, "Effect of anion type in the performance of ionic liquid/poly(vinylidene fluoride) electromechanical actuators, *Journal of Non-Crystalline Solids,* 453 (2016), 8-15.

174. R. Leones, C.M. Costa, A. V. Machado, J.M.S.S. Esperança, M.M. Silva, S. Lanceros-Méndez, "Effect of Ionic Liquid Anion Type in the Performance of Solid Polymer Electrolytes Based on Poly(Vinylidene fluoride-trifluoroethylene)," *Electroanalysis*. 27 (2015) 457–464.

175. D.M. Correia, R. Sabater i Serra, J.A. Gómez Tejedor, V. de Zea Bermudez, A. Andrio Balado, J.M. Meseguer-Dueñas, J.L. Gomez Ribelles, S. Lanceros-Méndez, C.M. Costa, "Ionic and conformational mobility in poly(vinylidene fluoride)/ionic liquid blends: Dielectric and electrical conductivity behavior," *Polymer (Guildf),* 143 (2018) 164–172.

176. J. Guan, C. Xing, Y. Wang, Y. Li, J.L.-C.S. and Technology, "Poly (vinylidene fluoride) dielectric composites with both ionic nanoclusters and well dispersed graphene oxide," *Composites Science and Technology*, 138 (2017) 98-105.

177. R. Mejri, J.C. Dias, S. Besbes Hentati, G. Botelho, J.M.S.S. Esperança, C.M. Costa, S. Lanceros- Mendez, "Imidazolium-based ionic liquid type dependence of the bending response of polymer actuators," *European Polymer Journal,* 85 (2016)

445–451.

178. J.C. Dias, M.S. Martins, S. Ribeiro, M.M. Silva, J.M.S.S. Esperança, C. Ribeiro, G. Botelho, C.M. Costa, S. Lanceros-Mendez, "Electromechanical actuators based on poly(vinylidene fluoride) with [N1 1 1 2(OH)][NTf2] and [C2mim] [C2SO4]," *Journal of Materials Science* , 51 (2016) 9490–9503.

179. J.R. Sangoro, F. Kremer, "Charge transport and glassy dynamics in ionic liquids," *Accounts of Chemical Research*, 45 (2012) 525–532.

180. R. Leones, C.M. Costa, A. V. Machado, J.M.S.S. Esperança, M.M. Silva, S. Lanceros-Méndez, "Development of solid polymer electrolytes based on poly(vinylidene fluoride-trifluoroethylene) and the [N1 1 1 2(OH)][NTf2] ionic liquid for energy storage applications," *Solid State Ionics*, 253 (2013) 143–150.

181. O. Prakash, A.M. Mhatre, R. Tripathi, A.K. Pandey, P.K. Yadav, S.A. Khan, P. Maiti, "Fabrication of Conducting Nanochannels Using Accelerator for Fuel Cell Membrane and Removal of Radionuclides: Role of Nanoparticles," *ACS Applied Materials & Interfaces*, 12 (2020) 17628–17640.

182. G.T. Hwang, H. Park, J.H. Lee, S. Oh, K. Il Park, M. Byun, H. Park, G. Ahn, C.K. Jeong, K. No, H. Kwon, S.G. Lee, B. Joung, K.J. Lee, "Self-powered cardiac pacemaker enabled by flexible single crystalline PMN-PT piezoelectric energy harvester," *Advanced Materials*, 26 (2014) 4880–4887.

183. B. Kumar, S.W. Kim, "Energy harvesting based on semiconducting piezoelectric ZnO nanostructures," *Nano Energy*, 1 (2012) 342–355..

184. C. Zhao, J. Niu, Y. Zhang, C. Li, P. Hu, "Coaxially aligned MWCNTs improve performance of electrospun P(VDF-TrFE)-based fibrous membrane applied in wearable piezoelectric nanogenerator," *Composites Part B: Engineering,* 178 (2019) 107447.

185. P.C. Ma, N.A. Siddiqui, G. Marom, J.K. Kim, "Dispersion and functionalization of carbon nanotubes for polymer-based nanocomposites: A review," *Composites Part A: Applied Science and Manufacturing,* 41 (2010) 1345–1367.

186. S. Vidhate, A. Shaito, J. Chung, N.A. D'Souza, "Crystallization, mechanical, and rheological behavior of polyvinylidene fluoride/carbon nanofiber composites," *Journal of Applied Polymer Science*, 112 (2009) 254–260.

187. D.K. Patel, S. Senapati, P. Mourya, M.M. Singh, V.K. Aswal, B. Ray, P. Maiti, "Functionalized Graphene Tagged Polyurethanes for Corrosion Inhibitor and Sustained Drug Delivery," *ACS Biomaterials Science & Engineering*, 3 (2017) 3351–3363.

188. M.H. Al-Saleh, U. Sundararaj, "Review of the mechanical properties of carbon nanofiber/polymer composites," *Composites Part A: Applied Science and Manufacturing,* 42 (2011) 2126–2142.

189. G.G. Tibbetts, M.L. Lake, K.L. Strong, B.P. Rice, "A review of the fabrication and properties of vapor-grown carbon nanofiber/polymer composites," *Composites Science and Technology,* 67 (2007) 1709–1718.

190. D. He, Z. Kou, Y. Xiong, K. Cheng, X. Chen, M. Pan, S. Mu, "Simultaneous

sulfonation and reduction of graphene oxide as highly efficient supports for metal nanocatalysts," *Carbon*, 66 (2014) 312–319.

191. A.D. Becke, "Density-functional thermochemistry. I. The effect of the exchange-only gradient correction," *The Journal of chemical physics*, 96 (1998) 2155.

192. A.D. Becke, "Density-functional thermochemistry. II. The effect of the Perdew–Wang generalized-gradient correlation correction," *The Journal of chemical physics*, 97 (1998) 9173.

193. K. Burke, J.P. Perdew, Y. Wang, "Derivation of a Generalized Gradient Approximation: The PW91 Density Functional," *Electronic density functional theory, Springer, Boston, MA*, (1998) 81–111.

194. A. Ali, Z.S. Khan, M. Jamil, Y. Khan, N. Ahmad, S. Ahmed, "Simultaneous reduction and sulfonation of graphene oxide for efficient hole selectivity in polymer solar cells," *Current Applied Physics*, 18 (2018) 599–610.

195. S. Imaizumi, H. Matsumoto, M. Ashizawa, M. Minagawa, A. Tanioka, "Nanosize effects of sulfonated carbon nanofiber fabrics for high capacity ion-exchanger," *RSC Advances*, 2 (2012) 3109–3114.

196. J. Wreczycki, D.M. Bieliński, M. Kozanecki, P. Maczugowska, G. Mlostoń, "Anionic copolymerization of styrene sulfide with elemental sulfur (S8)," *Materials*, 13 (2020).

197. P. Kaspar, D. Sobola, K. Částková, R. Dallaev, E. Šťastná, P. Sedlák, A. Knápek,

T. Trčka, V. Holcman, "Case study of polyvinylidene fluoride doping by carbon nanotubes," *Materials*, 14 (2021) 1–11.

198. Y.-T. Peng, C.-T. Lo, "Effect of Microstructure and Morphology of Electrospun Ultra-Small Carbon Nanofibers on Anode Performances for Lithium Ion Batteries," *Journal of the Electrochemical Society*, 162 (2015) A1085–A1093.

199. B.M. Thamer, H. El-Hamshary, S.S. Al-Deyab, M.H. El-Newehy, "Functionalized electrospun carbon nanofibers for removal of cationic dye," *Arabian Journal of Chemistry*, 12 (2019) 747–759.

200. F. Peng, L. Zhang, H. Wang, P. Lv, H. Yu, "Sulfonated carbon nanotubes as a strong protonic acid catalyst," *Carbon*, 43 (2005) 2405–2408.

201. S.K. Ghosh, D. Mandal, "Synergistically enhanced piezoelectric output in highly aligned 1D polymer nanofibers integrated all-fiber nanogenerator for wearable nano-tactile sensor," *Nano Energy*, 53 (2018) 245–257.

202. I.S. Elashmawi, L.H. Gaabour, "Raman, morphology and electrical behavior of nanocomposites based on PEO/PVDF with multi-walled carbon nanotubes," *Results in Phyiscs*, 5 (2015) 105–110.

203. O. Prakash, A.M. Mhatre, R. Tripathi, A.K. Pandey, P.K. Yadav, S.A. Khan, P. Maiti, "Lithium-Irradiated Poly(vinylidene fluoride) Nanohybrid Membrane for Radionuclide Waste Management and Tracing," *ACS Applied Polymer Materials*, 3 (2021) 2005-2017.

204. J. Yan, M. Liu, Y.G. Jeong, W. Kang, L. Li, Y. Zhao, N. Deng, B. Cheng, G.

Yang, “Performance enhancements in poly(vinylidene fluoride)-based piezoelectric nanogenerators for efficient energy harvesting,” *Nano Energy*, 56 (2019) 662–692.

205. J. Hutter, H.P. Lüthi, F. Diederich, “Structures and vibrational frequencies of the carbon molecules C2-C18 calculated by density functional theory,” *Journal of the American Chemical Society*, 116 (2002) 750–756.

206. F.F. Li, D.S. Wu, Y.Z. Lan, J. Shen, S.P. Huang, W.D. Cheng, H. Zhang, Y.J. Gong, “SOS‖TDDFT study on the dynamic third-order nonlinear optical properties of aniline oligomers based on the optimized configurations,” *Polymer* 47 (2006) 1749–1754.

207. L. Yang, J.K. Feng, A.M. Ren, J.Z. Sun, “The electronic structure and optical properties of carbazole-based conjugated oligomers and polymers: A theoretical investigation,” *Polymer,* 47 (2006) 1397–1404.

208. J.B. Lando, H.G. Olf, A. Peterlin, “Nuclear magnetic resonance and x-ray determination of the structure of poly(vinylidene fluoride),” *Journal of Polymer Science Part A-1: Polymer Chemistry*, 4 (1966) 941–951.

209. Z.Y. Wang, H.Q. Fan, K.H. Su, Z.Y. Wen, “Structure and piezoelectric properties of poly(vinylidene fluoride) studied by density functional theory,” *Polymer,* 47 (2006) 7988–7996.

210. E. Giannetti, “Semi-crystalline fluorinated polymers,” *Polymer international,* 50 (2001) 10-26.

211. Y. Li, X. Ma, Y. Ding, X. Li, Z. Li, “Density Functional Theory Simulation of

PVDF Transition in Electric Field Polarization," *2nd International Conference on Mathematics, Modeling and Simulation Technologies and Applications,* 93 (2019) 21–25.

212. Vladimir S.Bystrov, Ekaterina V. Paramonova, Igor K. Bdikin, Anna V. Bystrova, Robert C. Pullar, and Andrei L. Kholkin, "Molecular modeling of the piezoelectric effect in the ferroelectric polymer poly (vinylidene fluoride)(PVDF)," *Journal of Molecular Modeling*, 19 (2013) 3591-3602.

List of Publications

- **Research Articles:**

1. "Ionic Liquid-Based Electrospun Polymer Nanohybrid for Energy Harvesting," **Shivam Tiwari**, Anupama Gaur, Chandan Kumar, Pralay Maiti, **ACS Applied Electronic Materials**, 2021, 3, 6, 2738-2747.
2. "Enhanced piezoelectric response in nanoclay induced electrospun PVDF nanofibers for energy harvesting", **Shivam Tiwari**, Anupama Gaur, Chandan Kumar, Pralay Maiti, **Energy**,2019, 171, 485-492.
3. "Dehydrohalogenated poly(vinylidene fluoride)-based anion exchange membranes for fuel cell applications", Om Prakash, Shyam Bihari, Keshav, **Shivam Tiwari**, Ravi Prakash, Pralay Maiti, **Materials Today Chemistry**, 2022, 100640.
4. "Polymer Biowaste Hybrid for Enhanced Piezoelectric Energy Harvesting", Anupama Gaur, **Shivam Tiwari**, Chandan Kumar, Pralay Maiti. **ACS Applied Electronic Materials**, 2020, 2, 1426-1432.
5. "Flexible, Lead-Free Nanogenerators using Poly(vinylidene fluoride) Nanocomposites", Anupama Gaur, **Shivam Tiwari**, Chandan Kumar, Pralay Maiti, **Energy & Fuels**, 2020, 34, 6239-6244
6. "PVDF–PZT nanohybrid based nanogenerator for energy harvesting applications", Shivaji. H. Wankhade, **Shivam Tiwari**, Anupama Gaur, Pralay Maiti. **Energy Reports**, 2020, 6, 358-364.
7. "Bio-waste orange peel and polymer hybrid for efficient energy harvesting", Anupama Gaur, **Shivam Tiwari**, Chandan Kumar, Pralay Maiti, **Energy Reports**, 2020, 6, 490-496.

8. “Bio-waste polymer hybrid as induced piezoelectric material with high energy harvesting efficiency,” Chandan Kumar, Anupama Gaur, **Shivam Tiwari**, Arpan Biswas, Sanjay Kumar Rai, Pralay Maiti, **Composites Communications**, 2019, 11, 56-61.
9. “Efficient energy harvesting using processed poly (vinylidene fluoride) nanogenerator”, Anupama Gaur, Chandan Kumar, **Shivam Tiwari**, Pralay Maiti, **ACS Applied Energy Materials**, 2018, 1(7), 3019-3024.
10. “Efficient and Controlled Herbicide Delivery through Conjugate Gel Formulation on Broad Leaf Weeds Mortality”, Reshu Bhardwaj, Om Prakash, **Shivam Tiwari**, Preeti Maiti, Sandipta Ghosh, Ram Singh, Pralay Maiti. **ACS Omega**, 2022, 7, 23, 19964–19978.
11. “Experimentally optimized facile particle-polymer composite structure for efficient daytime radiative cooling”, Jay Prakash Bijarniya, **Shivam Tiwari**, Pralay Maiti, Jahar Sarkar (Accepted)
12. “Effect of functionalization on electrospun PVDF nanohybrid for piezoelectric energy harvesting applications,” **Shivam Tiwari**, Dipesh Dubey, Om Prakash, Santanu Das and Pralay Maiti (Under Review)
13. “The effect of induced piezoelectric phase in polymer-based hybrids for energy harvesting application”, **Shivam Tiwari**, Anupama Devi, Dipesh Dubey and Pralay Maiti. (Under Review)
14. “Fluoropolymers and their Nanohybrids as Energy Materials: Application to Fuel Cell and Energy Harvesting" **Shivam Tiwari,** Om Prakash, and Pralay Maiti (Under Review)

- **Book Chapter:**

1. "2D materials - polymer composites for developing piezoelectric energy harvesting devices." **Shivam Tiwari** and Pralay Maiti. Publisher: Elsevier

- **Patents:**

1. 'PVDF-Nanoclay based electrospun nanohybrid for efficient energy harvesting application.' **Shivam Tiwari**, Anupama Gaur, Chandan Kumar, Pralay Maiti, Application No. - 201811018838 **(Published)**

2. 'A bio-waste polymer hybrid with high energy harvesting efficiency', **Shivam Tiwari**, Anupama Gaur, Chandan Kumar, Pralay Maiti Application No. - 201811016816 **(Published)**

3. 'A metal ceramic joint adhesive;' **Shivam Tiwari**, Santanu Das and Pralay Maiti Application No. 201911002765 **(Published) (Technology Transferred to Industry)**

4. 'A bio-piezoelectric device and a method of preparation thereof' **Shivam Tiwari**, Anupama Gaur, Chandan Kumar, Pralay Maiti Application No. 201911013972 (**Published**)

- **Conferences:**

1. **Poster presentation** in **SPSI-MACRO** conference in IISER PUNE and NCL-PUNE from 19-22 December 2018.
2. **Poster Presentation** in 2nd **Indian Material Conclave** and 31st **AGM** at Kolkata organised by Materials Research Society of India from 11-14th February 2020.

3. **Participated** in the Short Term Course on **Advanced Energy Materials** from 12 – 16th Oct.2020, organized by Department of Physics, Dr. B.R. Ambedkar NIT, Jalandhar, Punjab (India).
4. **Participated** in the International Winter School on **Frontiers in Materials Science** (A virtual event) held at JNCASR during December 07-11, 2020.
5. **Oral presentation** in International Conference on **Advanced Materials for Better Tomorrow** (AMBT-2021) oragnised by SIRMB and IIT (BHU) from 13-17 July 2021.
6. **Short invited lecture** in International Online Conference on Macromolecules: Synthesis, Morphology, Processing, Structure, Properties and Applications (ICM 2021)10th-12th September 2021, Kerala, India. (Awarded 3rd Prize)
7. **Short invited talk** in International Online Conference on Materials Science and Technology (ICMT-2021) Nov 12-14 2021, Kottayam, Kerala, India
8. **Short invited lecture** in International Online Conference on Macromolecules: Synthesis, Morphology, Processing, Structure, Properties and Applications (ICM 2021)10th-12th September 2021, Kerala, India. (Awarded 3rd Prize)
9. Delivered **Oral presentation: Scientifique** in **Research and Industrial Conclave**, IIT Guwahati during 2022 (20-23rd Jan 2022). (Secured First place)
10. **Poster presentation** in **APA NANOFORUM-2022 |** NPL & IIT Delhi, Delhi India (24-26th Feb 2022). (Best Poster Award)
11. **Presented Paper** in National Seminar organised by Kashi Naresh P.G. College, Gyanpur, Bhadohi on 25-26th March 2022. (Best Paper Award)