Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Structural control of dielectric, pyroelectric and ferroelectric properties of poly(vinylidene fluoride-co-trifluoroethylene) thin films

C.Y.B. Ng[1], W.C. Gan[2], T. S. Velayutham[1,3*], B.T. Goh[1] and R. Hashim[3]

[1]*Low Dimensional Materials Research Center, Department of Physics, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia*

[2] *School of Energy and Chemical Engineering, Xiamen University Malaysia, Selangor Darul Ehsan 43900, Malaysia & College of Chemistry and Chemical Engineering, Xiamen University, Xiamen 361005, China*

[3] *Centre for Fundamental and Frontier Sciences in Nanostructure Self-Assembly, Department of Chemistry, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia*

**Email: t_selvi@um.edu.my*

**Tel: +60379677022 ext 2733*

Supporting Information

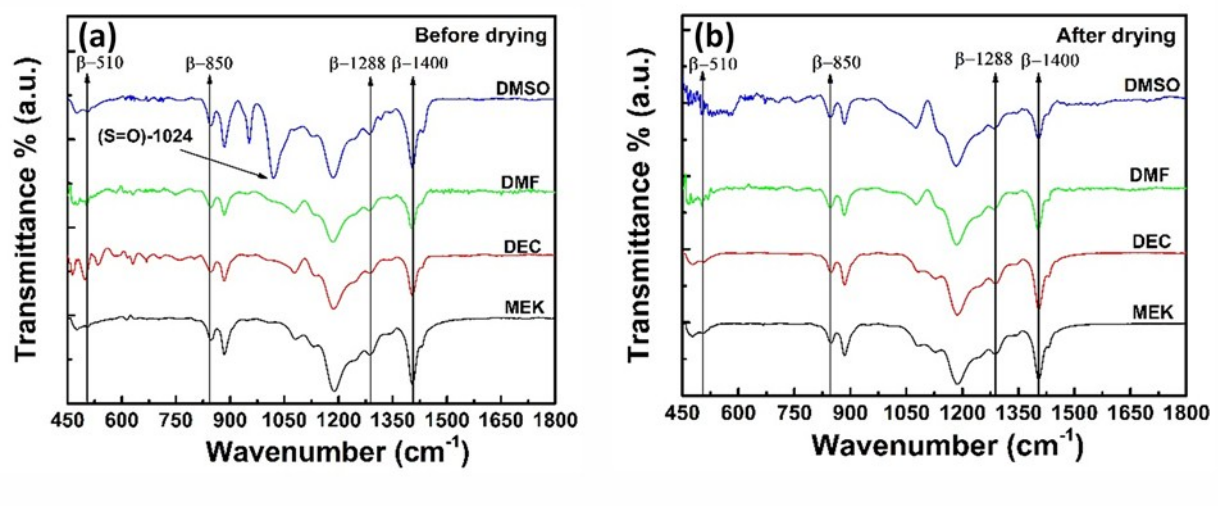

Fig. S1: FTIR spectra of P(VDF-TrFE) film prepared using different solvents (a) before and (b) after drying for 24 hours at 80 °C. Incomplete drying in the sample prepared using DMSO shows the characteristic peak of DMSO at 1024 cm^{-1} ; stretching vibration of S=O bonding.[1] However, the rest of the films show no traces of their respective solvents.[2-4] DMSO has the highest boiling point (189 °C) and thus the evaporation rate after spin-coating is rather slow compared to MEK, DEC and DMF with the boiling point of 80 °C, 126 °C and 153 °C respectively. Complete removal of solvent for all samples was evident by the loss of the solvent characteristic peak while showing only the β-crystalline peaks (510 cm^{-1}, 850 cm^{-1}, 1288 cm^{-1}, 1400 cm^{-1}).[5]

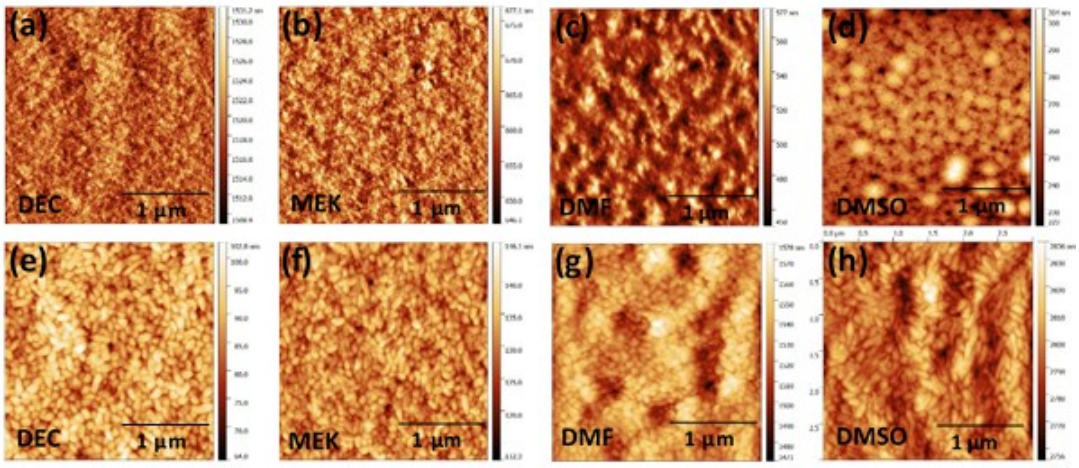

Fig. S2: AFM images of cast VDF copolymer thin films prepared using DEC, MEK, DMF and DMSO annealed at (a)-(d) 80 °C and (e)-(h) 120 °C.

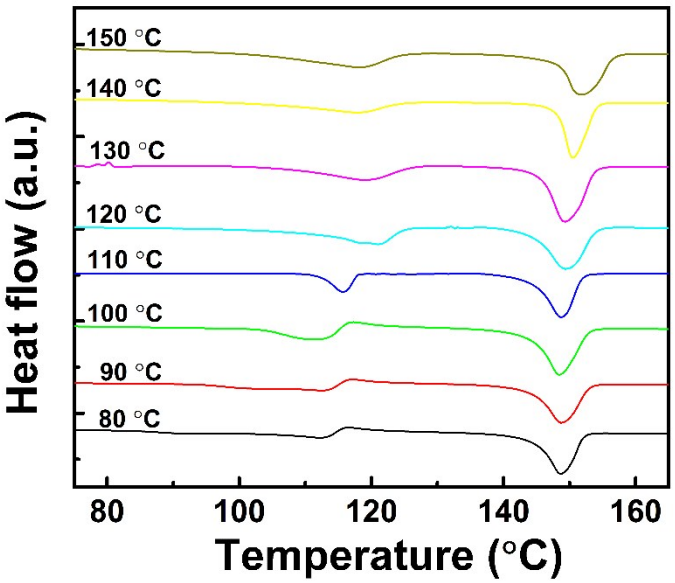

Fig. S3: DSC thermograms (heating) of P(VDF-TrFE) films annealed at various temperature.

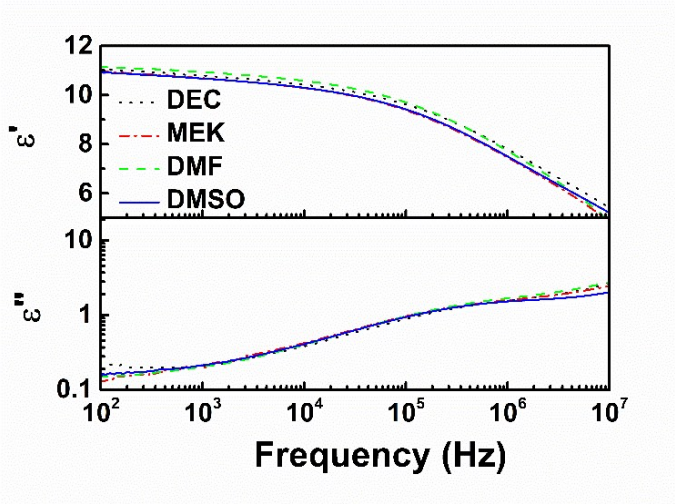

Fig. S4: Effect of solvent choices on the dielectric spectra (measured at room temperature) for the copolymer thin films.

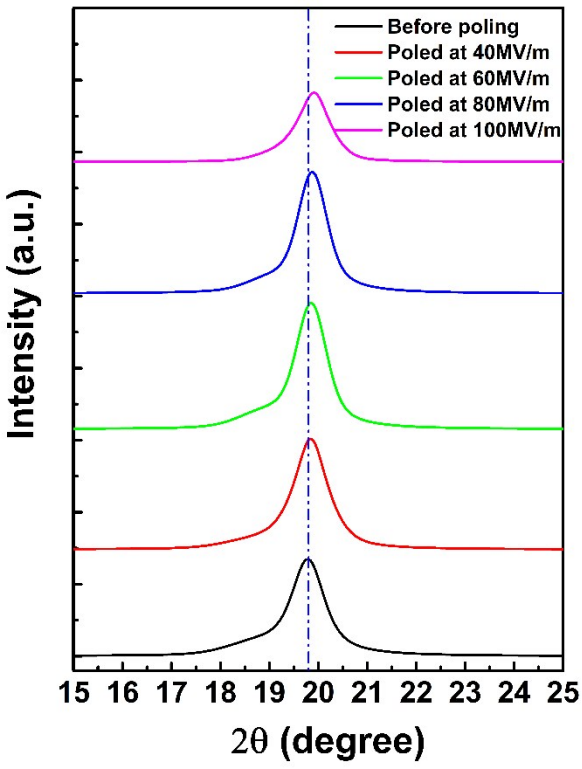

Fig. S5: Change in the (110)/(200) peak position before and after the ferroelectric polarisation reversal at different electric fields.

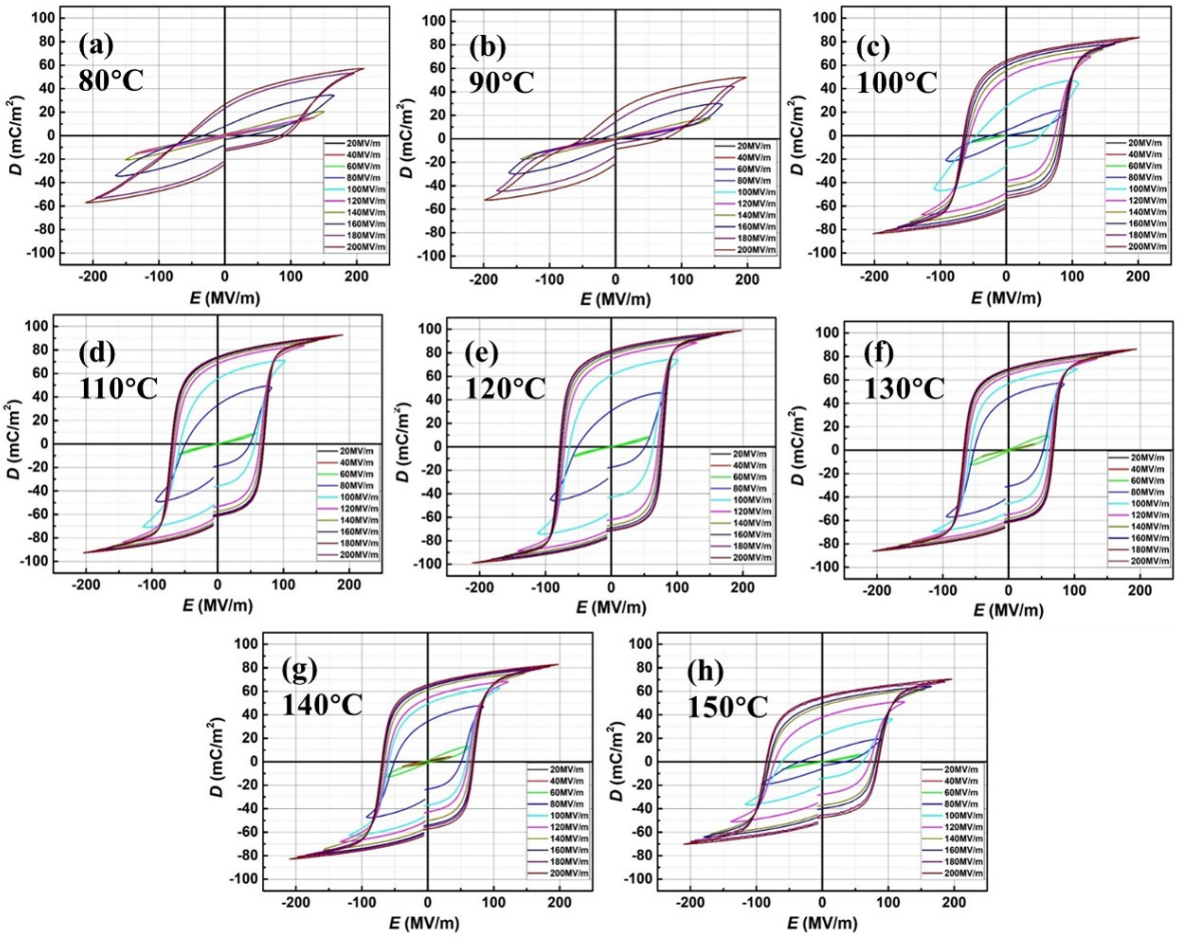

Fig. S6: *D-E* hysteresis loops of DMSO casted thin film prepared at different annealing temperatures.

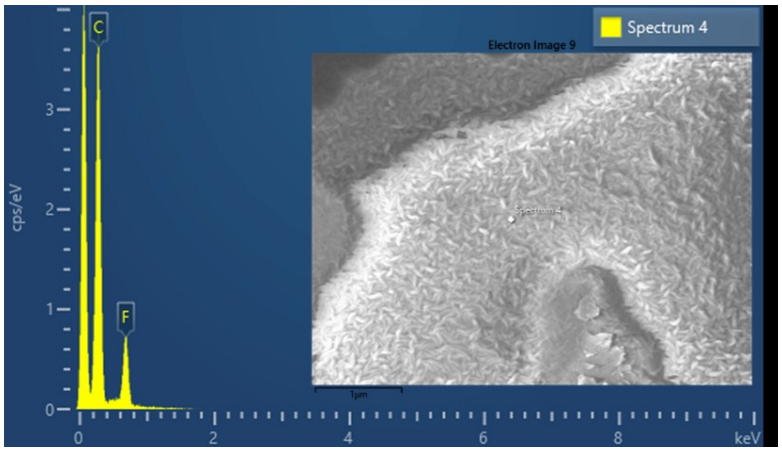

Fig. S7: Point scan EDX of PVDF-TrFE (120 °C).

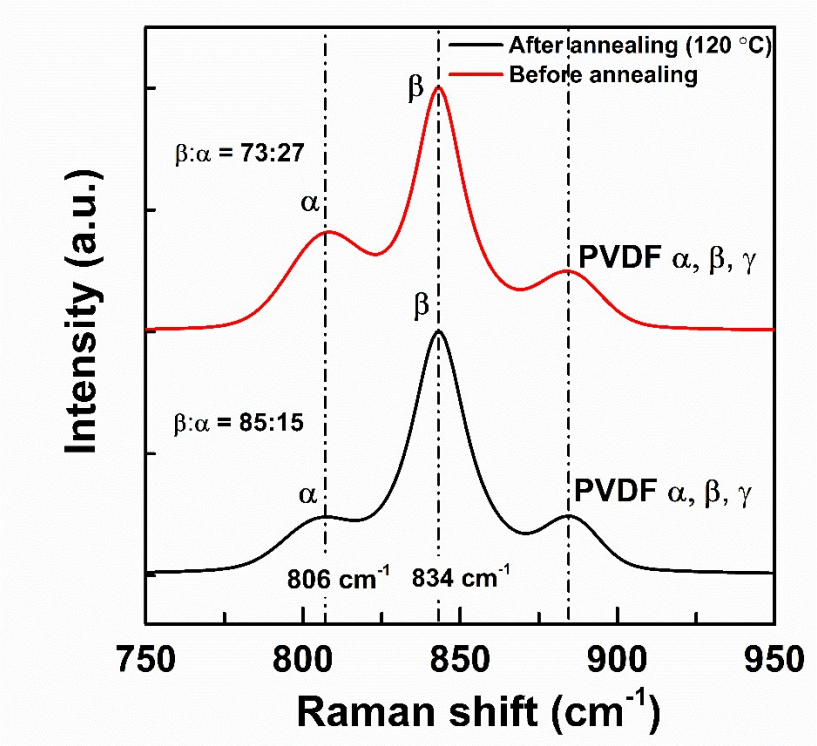

Fig. S8: Raman spectra of PVDF-TrFE samples before and after annealing (120 °C). 806 cm^{-1} and 834 cm^{-1} represent the α- and β-phase of PVDF-TrFE while 880 cm^{-1} represents the α-, β- and ϒ- phase of PVDF.

Notes and references

1. W. Zhang, Y. Jiang, Y. Ding, M. Zheng, S. Wu, X. Lu, X. Gao, Q. Wang, G. Zhou, J. Liu, M. J. Naughton, K. Kempa and J. Gao, Opt. Mater. Express **7** (7), 2150-2160 (2017).
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