Supplementary Information (SI) for Physical Chemistry Chemical Physics.
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Supplementary Information File

Flexible electrospun KNN-MXene/PVDF-HFP composite nanofibers with enhanced dielectric properties for capacitive pressure sensing application

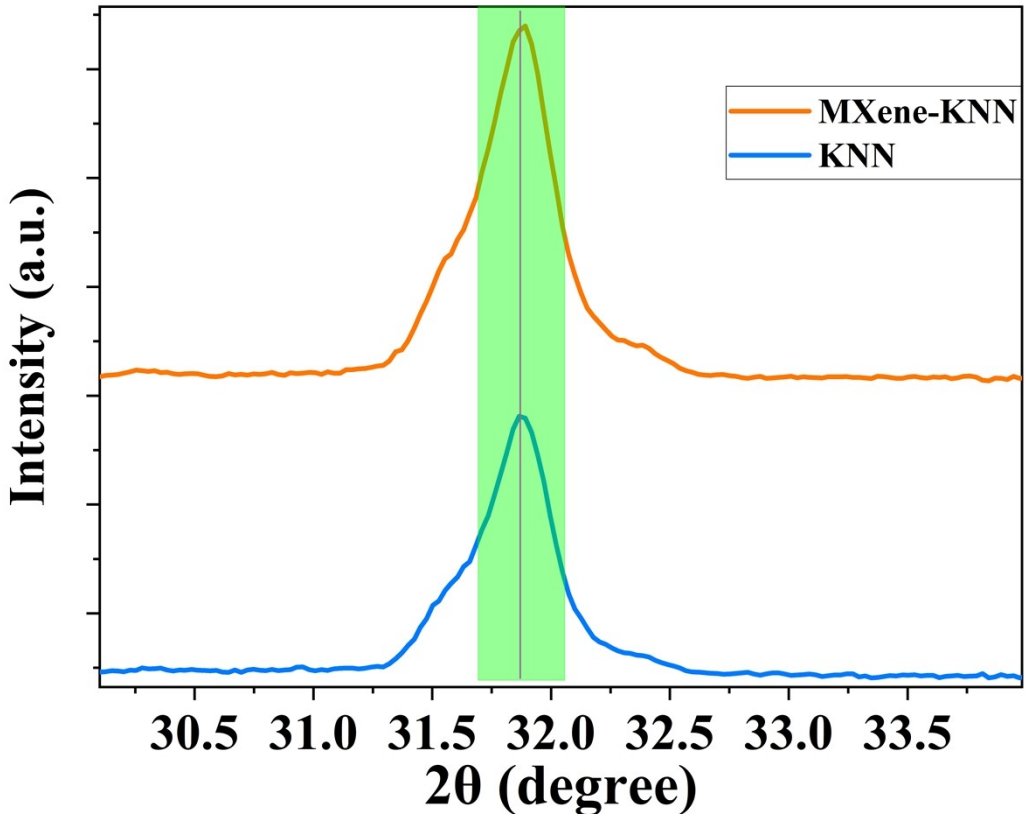


Figure S1: The comparison of the X-ray diffraction pattern of KNN and KNN-MXene composite, a shift towards a higher value of 2θ is observed for the composite

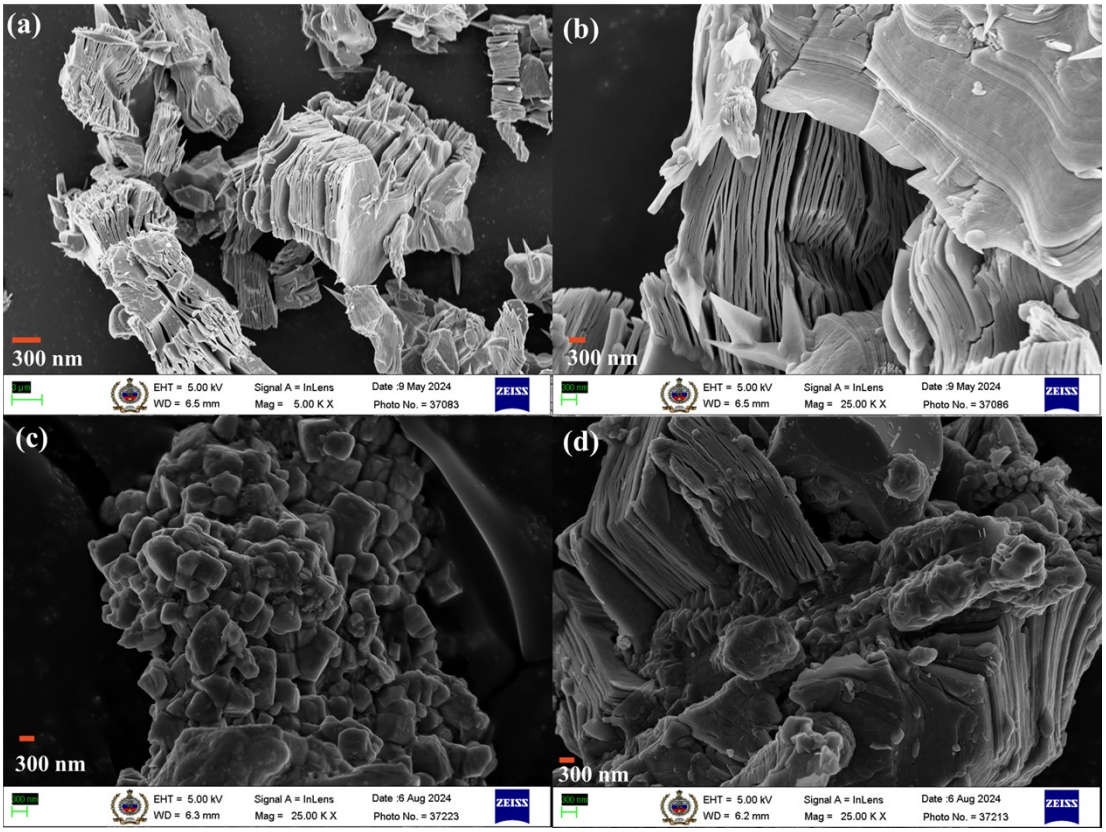


Figure S2 Scanning electron microscopic images of (a) MXene, (b) MXene (magnified), (c) KNN ceramics, and (d) KNN-MXene ceramics

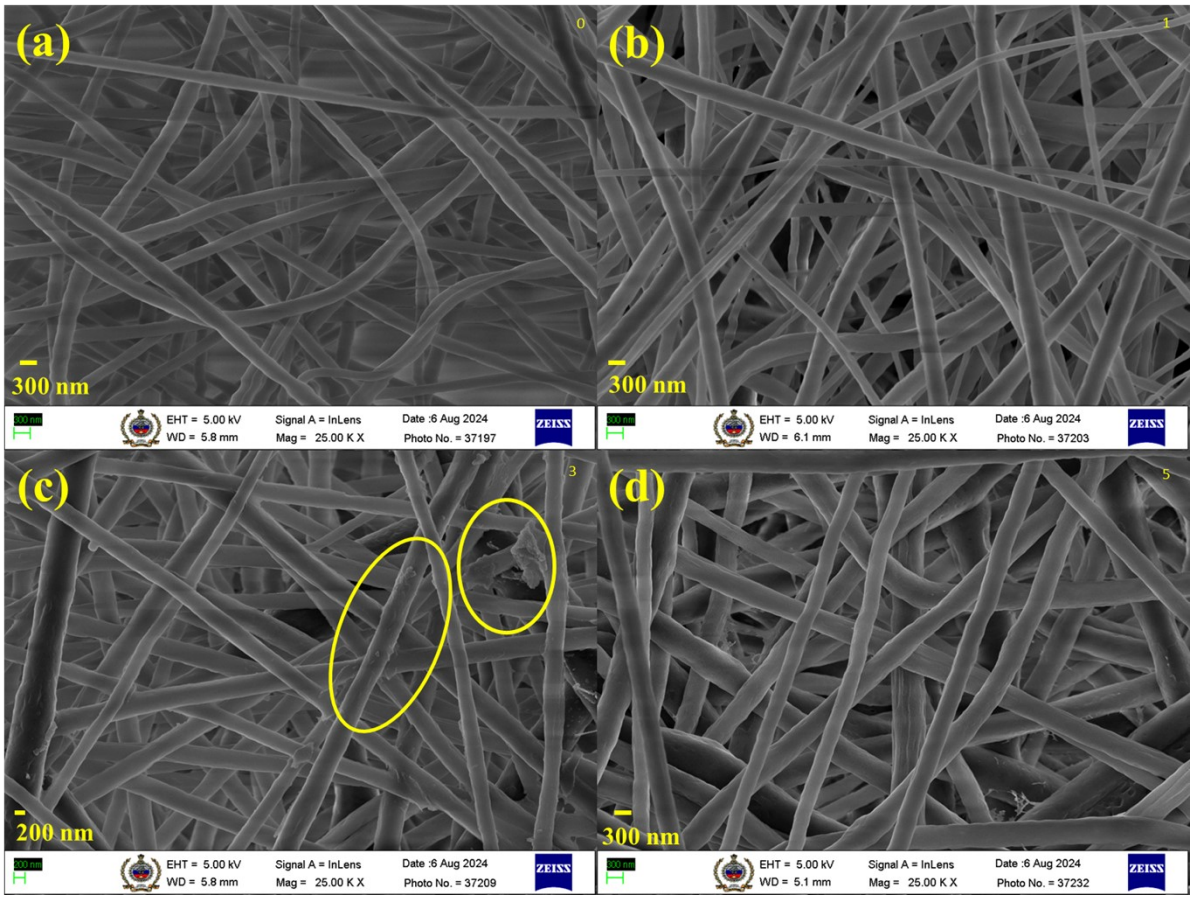
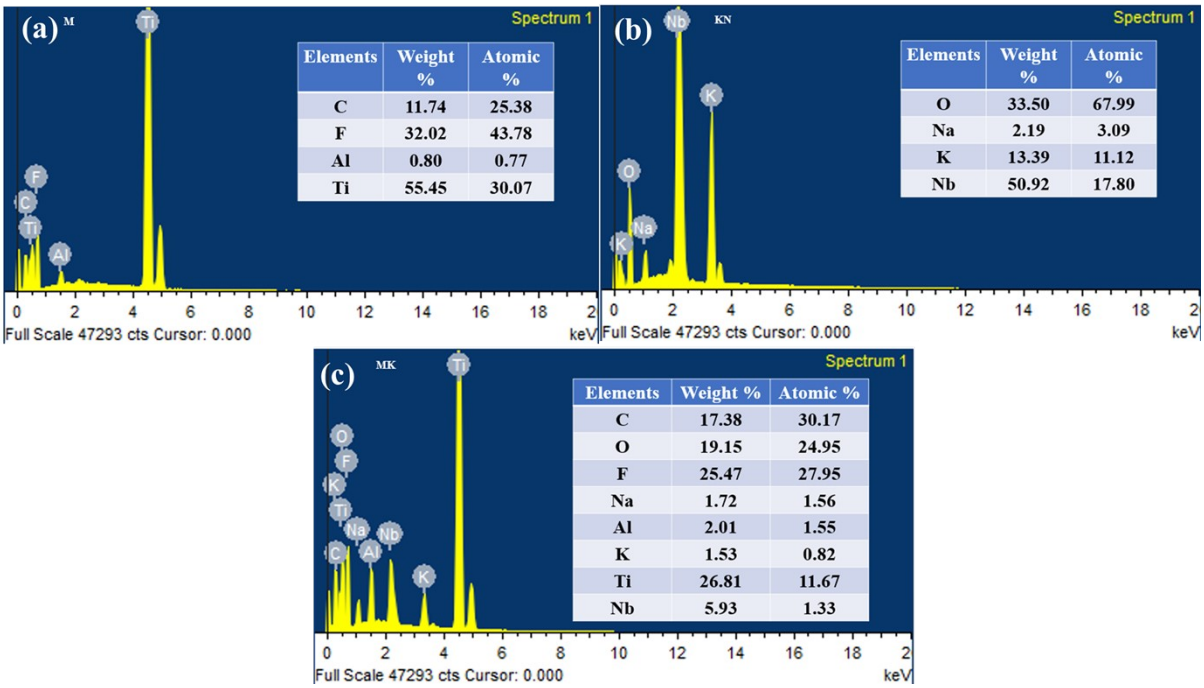


Figure S3 The SEM images of KNN-MXene/PVDF-HFP composite fibres at higher magnification, showing the presence of filler in 3 wt% KNN-MXene/PVDF-HFP



Elements	Weight %	Atomic %
C	11.74	25.38
F	32.02	43.78
Al	0.80	0.77
Ti	55.45	30.07

Elements	Weight %	Atomic %
O	33.50	67.99
Na	2.19	3.09
K	13.39	11.12
Nb	50.92	17.80

Elements	Weight %	Atomic %
C	17.38	30.17
O	19.15	24.95
F	25.47	27.95
Na	1.72	1.56
Al	2.01	1.55
K	1.53	0.82
Ti	26.81	11.67
Nb	5.93	1.33

Figure S4 EDS analysis of (a)MXene, (b) KNN, and (c)MXene-KNN

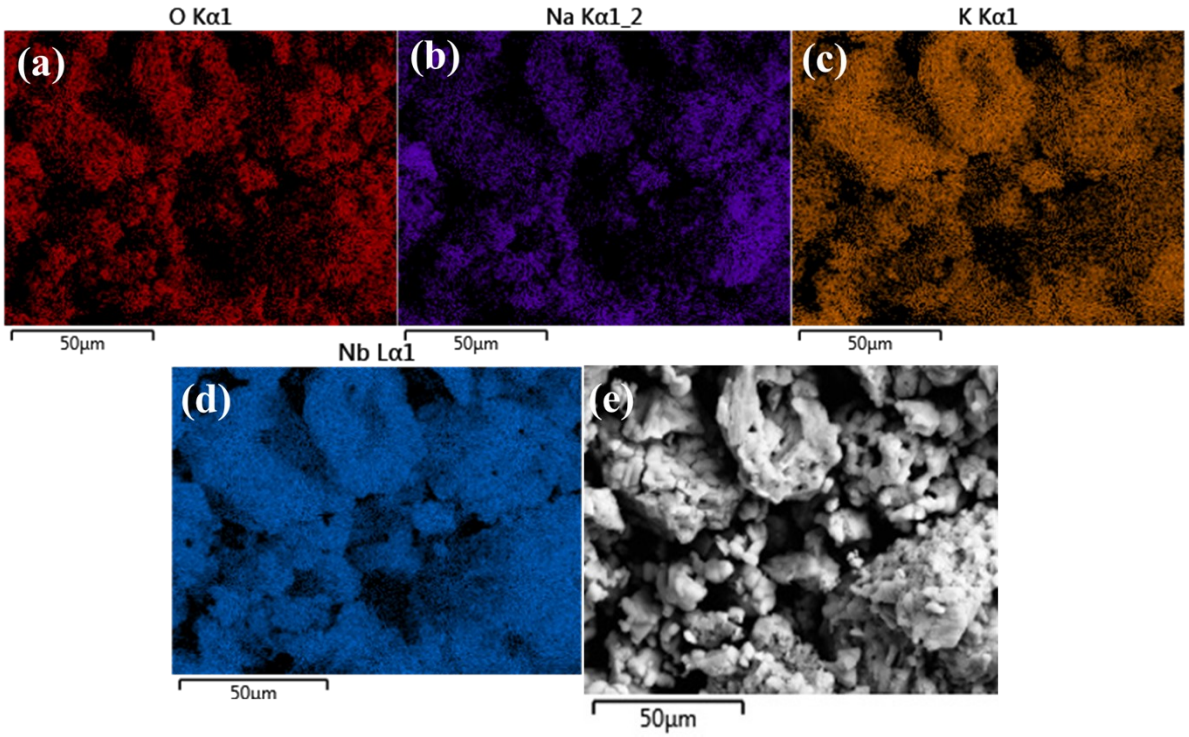


Figure S5 Elemental mapping of KNN ceramics

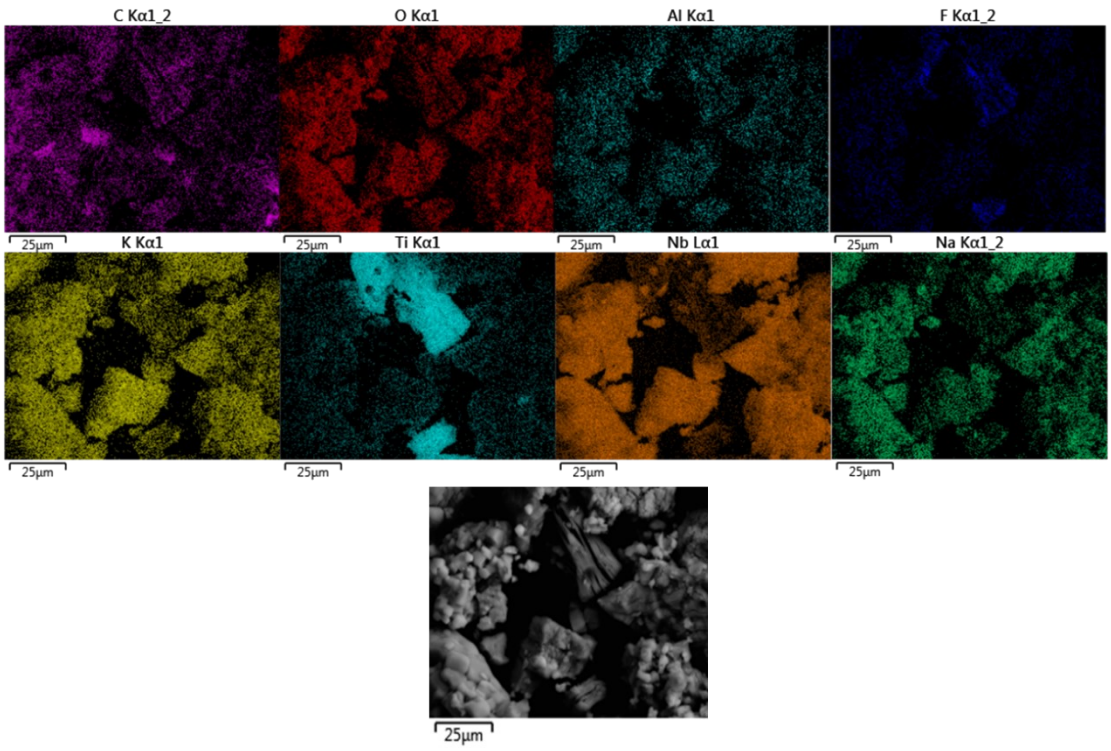


Figure S6 Elemental mapping of KNN-MXene composite

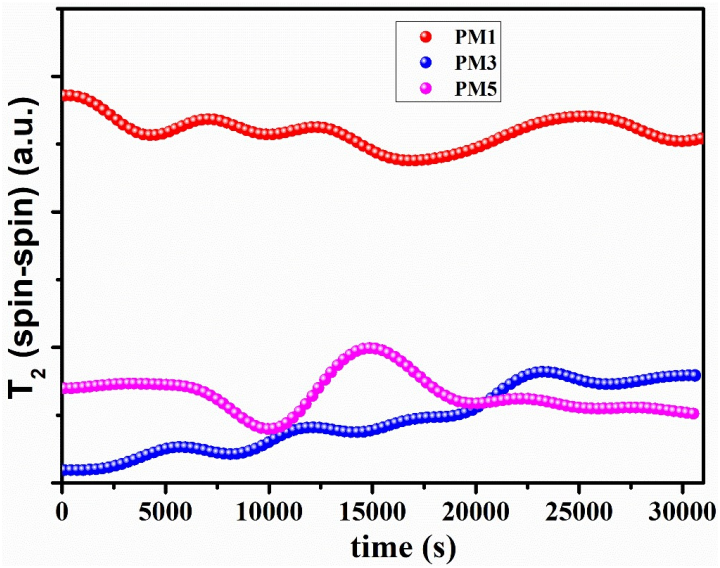


Figure S7 T2 spin-spin relaxation studies of KNN-MXene/PVDF-HFP composite fibres

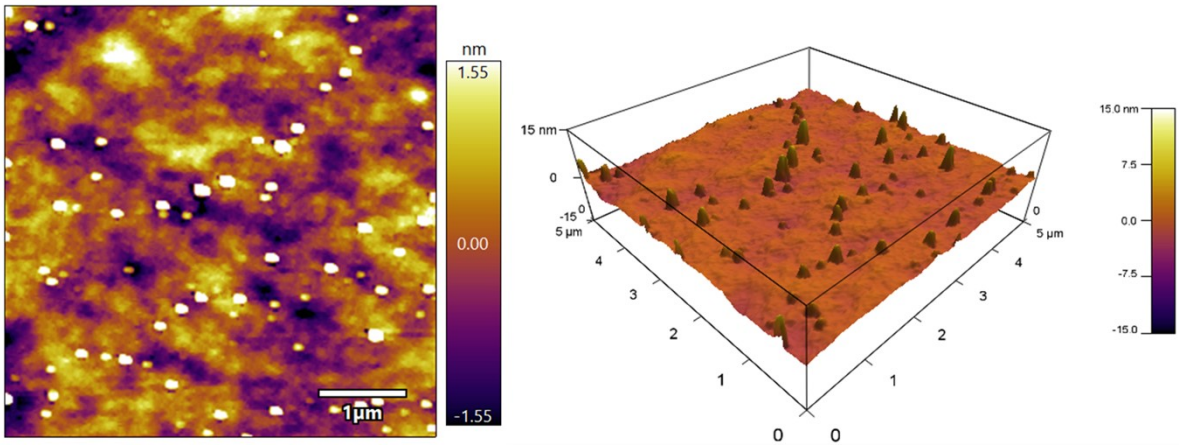


Figure S8 The atomic force microscopic lateral image, and 3D height profile for KNN-MXene ceramics

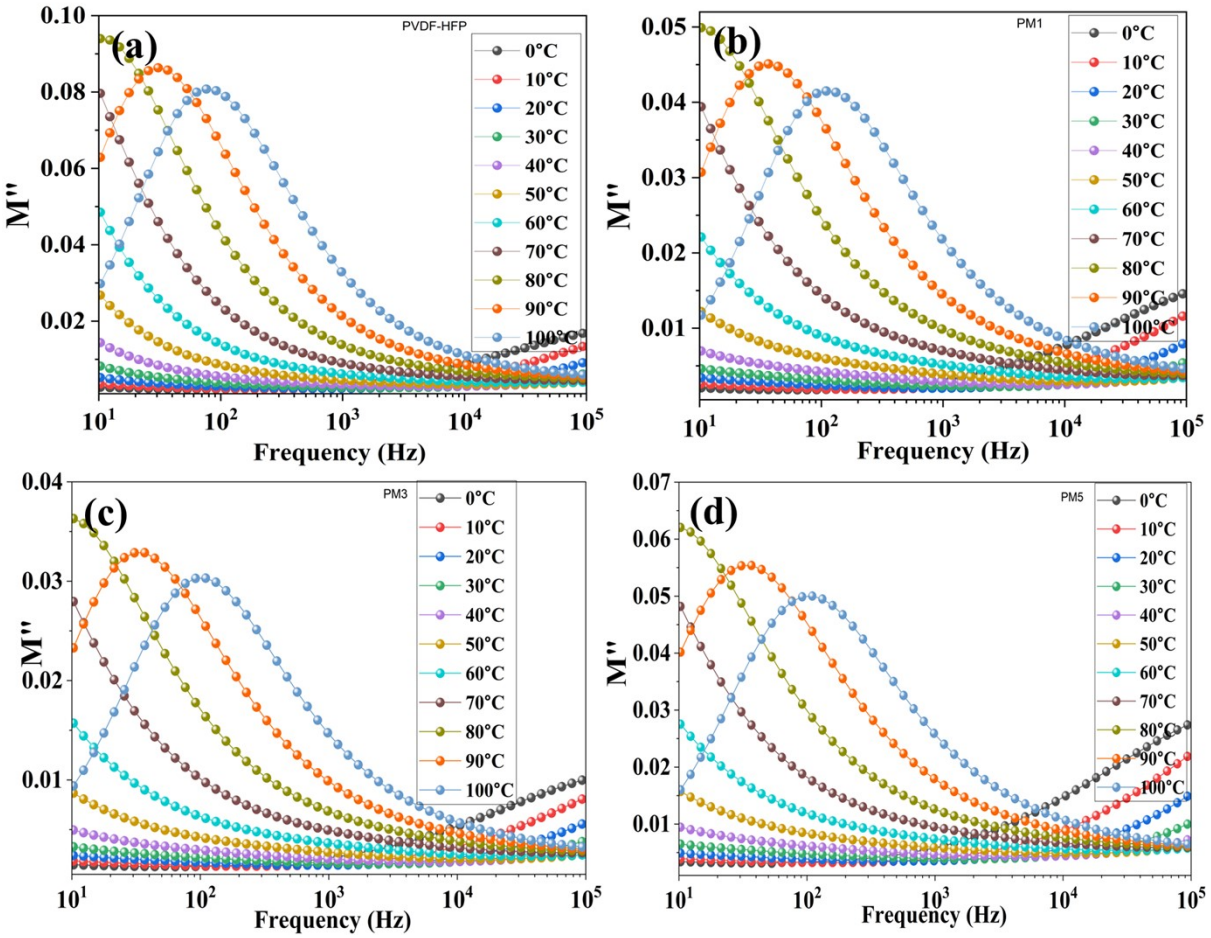


Figure S9 M" as a function of *f* and *T* for (a) P, (b) PM1, (c) PM3, and (d) PM5 fibre composites

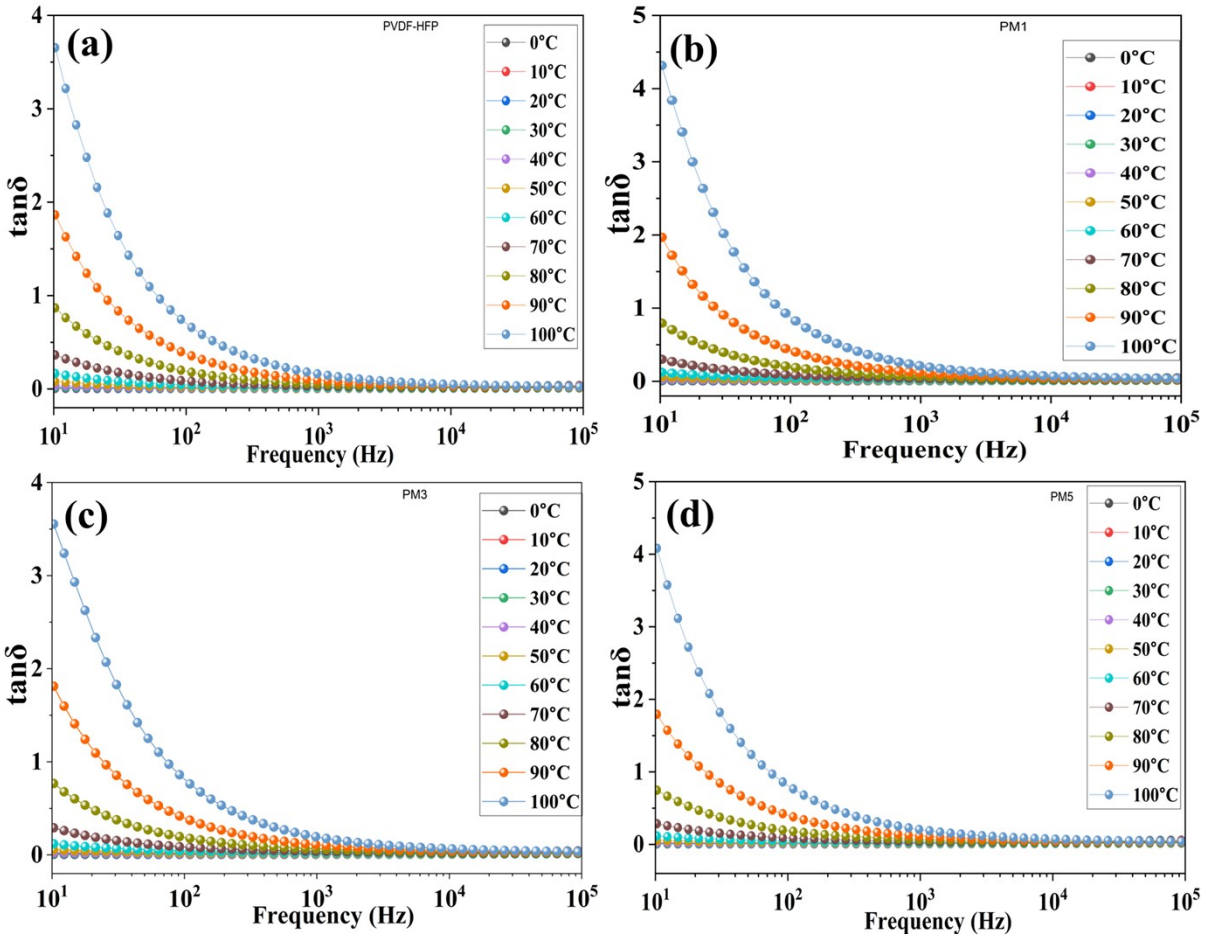


Figure S10 Loss tangent as a function of *f* and *T* for (a) P, (b) PM1, (c) PM3, and (d) PM5 fibre composites

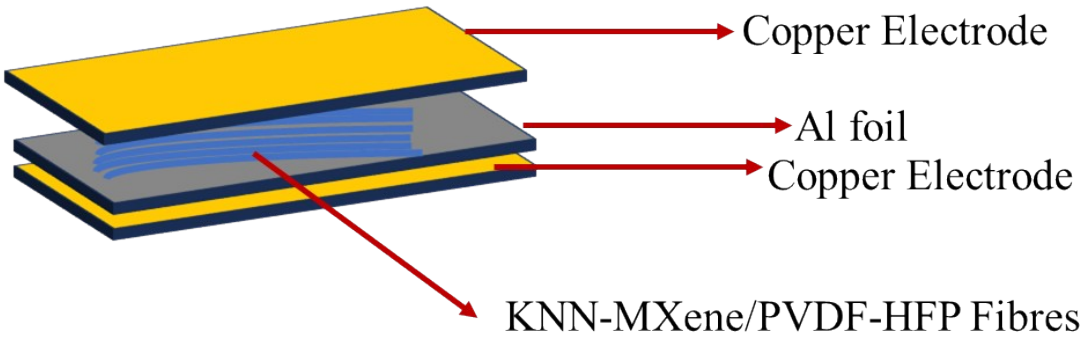


Figure S11 The schematics of electroding of electrospun fibres for the dielectric measurements. For the dielectric measurements at RT, the aluminium foil is kept as it is on which the fibres were coated

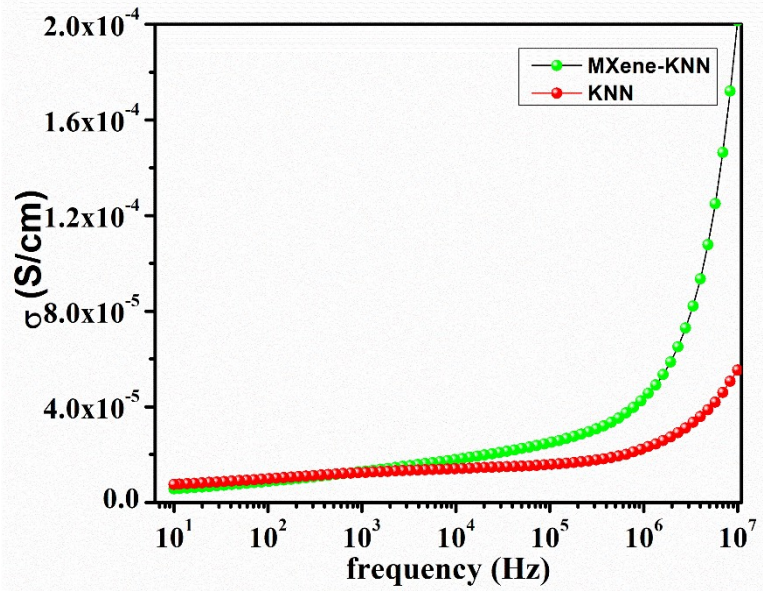


Figure S12 The extended plot of conductivity measurements of KNN-MXene and KNN ceramics to visualise Jonscher's power law behaviour

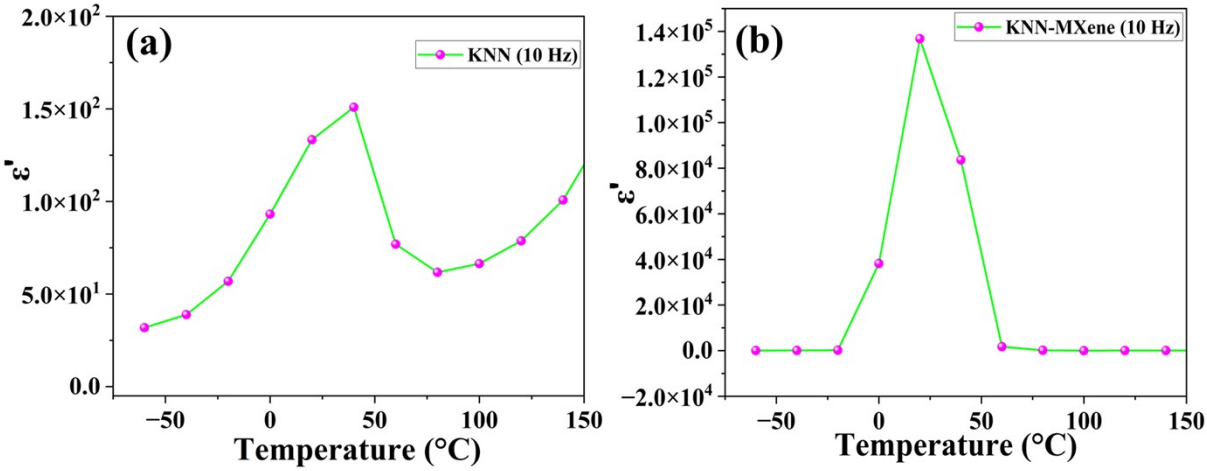


Figure S13 The observation of a new phase boundary at room temperature (~ 27 °C) in the dielectric constant vs temperature plot for (a) KNN and (b) KNN-MXene ceramics at 10 Hz

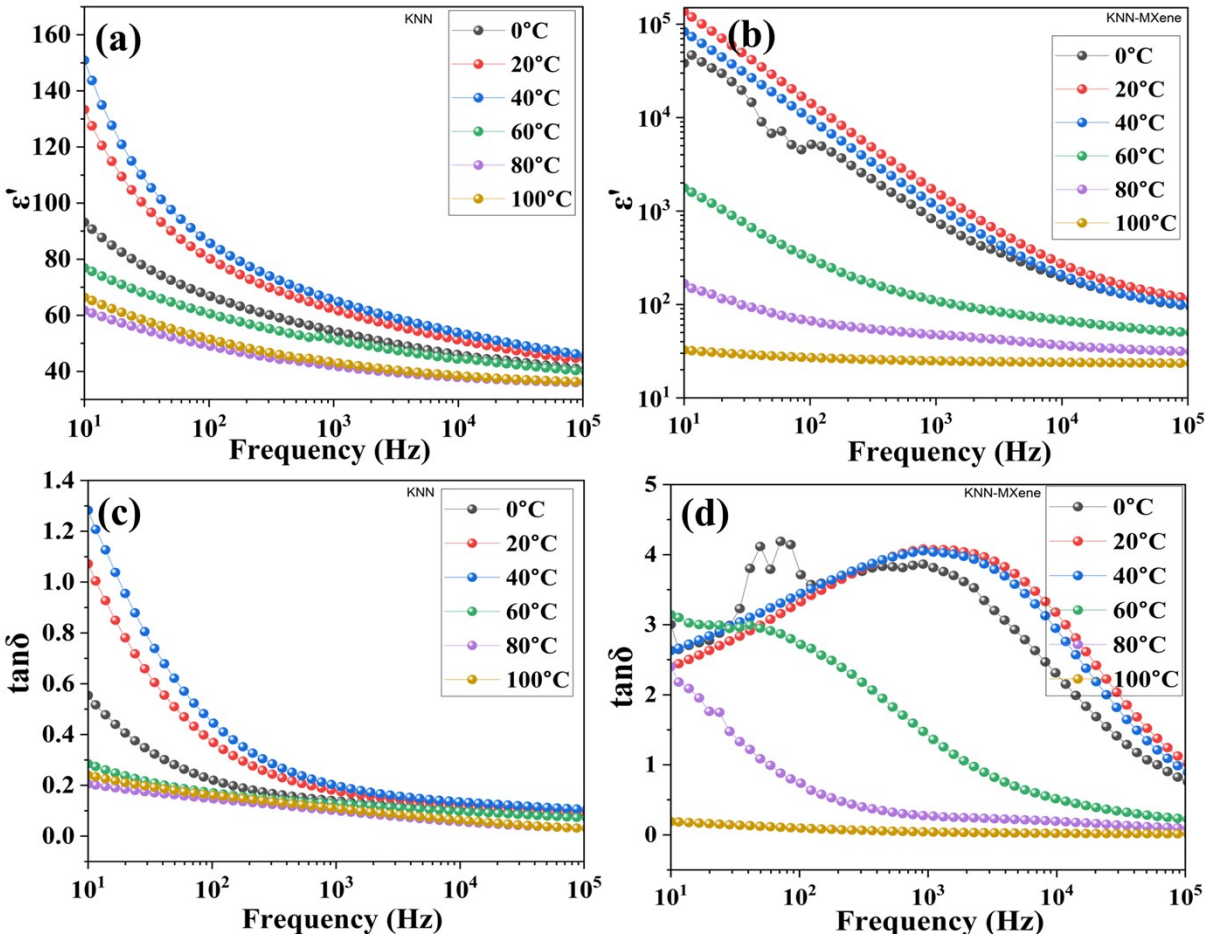


Figure S14 The dielectric constant as a function of frequency and temperature for (a) KNN and (b) KNN-MXene; the loss tangent as a function of frequency and temperature for (a) KNN, (b) KNN-MXene

Table S1 The crystalline phase percentage evaluation in composite fibres using FT-IR analysis

Sample	**β-phase %**
Pure PVDF-HFP	86.3
PM1	86.8
PM3	86.5
PM5	88.5

Table S2: The qualitative analysis of crystalline phases in composite fibres using Raman spectra

Sample	**I_{795} (relative)**	**I_{840}(relative)**	**Ratio (I_{840}/I_{795})**
PVDF-HFP	0.755	1.000	1.323
PM1	0.756	1.000	1.317
PM3	0.674	1.000	1.484
PM5	0.759	1.000	1.318

Table S3: The conductivity values of composite fibres at ~1 kHz and room temperature

Sample	**σ(pS/cm)**
PVDF-HFP	10.8
PM1	22.3
PM3	24.9
PM5	15.5