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

Electronic Supplementary Information

The Influence of Hydrogen Bonding on Dielectric Constant and Piezoelectric Energy Harvesting Performance of Hydrated Metal Salt Mediated PVDF Films

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Concerning the coordination site, DMF has two possible ligands, i.e., oxygen in the C=O and nitrogen in the C-N bond. Young *et. al.* discussed the donor number (DN) and acceptor number (AN) as a measure of the basicity and acidity of a solvent, respectively, to describe the strength of interactions between metal and non-aqueous solvent molecules [33]. Since DMF has DN and AN values (DN = 24.0, AN = 16.016) similar to those of pyridine (DN = 33.1, AN = 14.2) that has been generally known as one of the best donors, DMF is likely to behave as a strong donor.

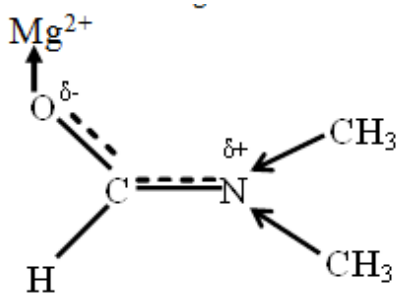

Fig. S1. Resonance Structure of DMF in the Mg^{2+}

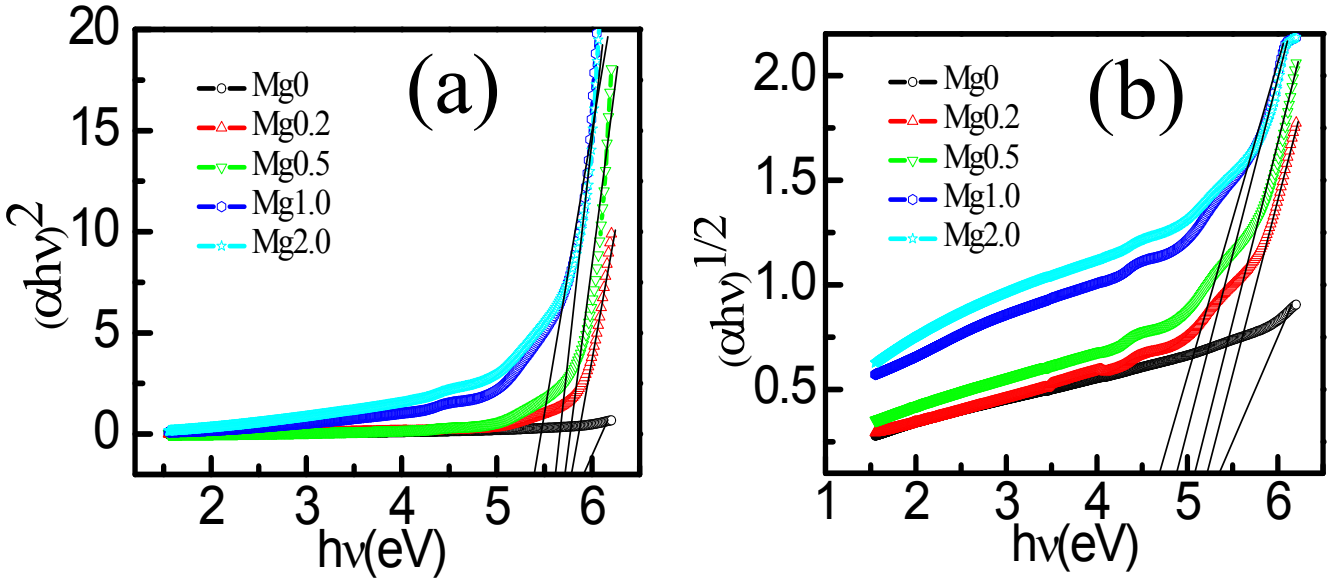

Fig. S2. Energy band gap for (a) direct transition and (b) indirect transition of Mg# (where # stands for 0, 0.2, 0.5, 1.0, 2.0) filler films.

Table 1 Variation of optical band gap of Mg# (where, #: 0.2, 0.5, 1.0, 2.0) filler films.

Concentration (Mg-salt filler)	Band gap (eV)	
	Direct	Indirect
0.2	5.78	5.22
0.5	5.69	5.00
1.0	5.59	4.84
2.0	5.32	4.62

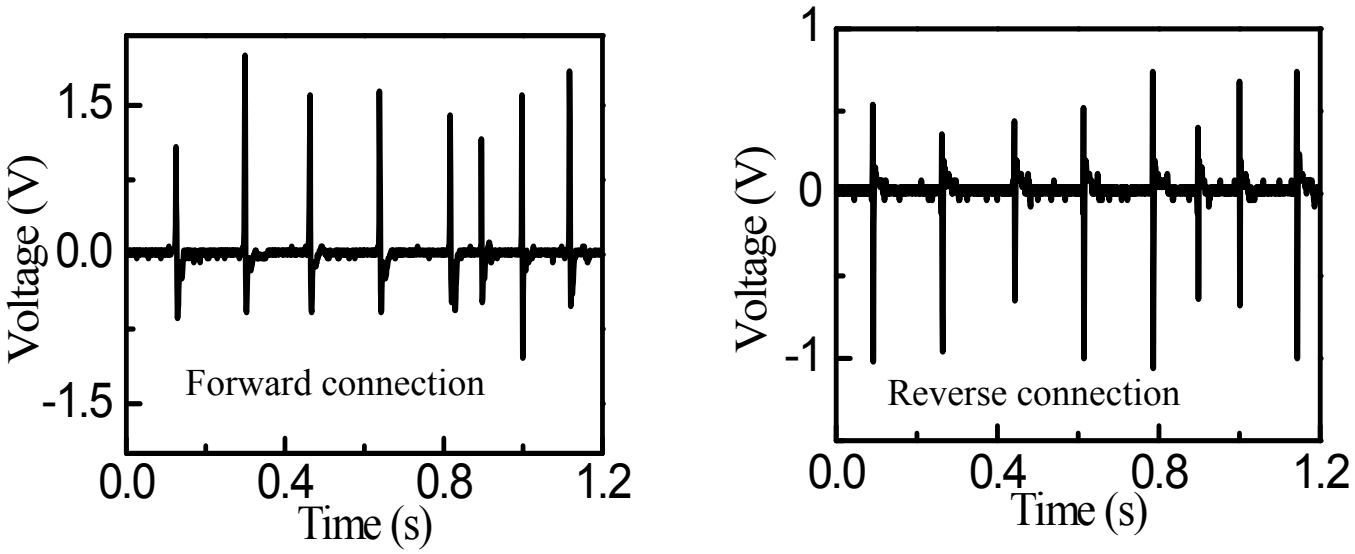

Fig. S3. Output open circuit voltage of MG0.2 film under (a) forward connection and (b) reverse connection mode.

(P1) Input pressure (σ) calculation

When the finger contact on the film, there exist two processes (a) initially touching the surface of the film, and (b) completely acting on the film.[2,3] The descending velocity of the object increases to maximum value in the first process and decreases to zero in the second one. Therefore, based on the kinetic energy theorem and momentum theorem, we have

$$m \cdot g \cdot h = (\tfrac{1}{2}) \cdot m \cdot v^2$$

$$(F \quad m \cdot g). \Delta t = m \cdot v$$

$$\sigma = F/S$$

Where m is the mass of the object, h is the falling height, v is the maximum falling velocity, σ is the contact pressure, F is the contact force, S is the contact area, and Δt is the time spanning during second process.

Here, S= 720 mm^2 is the electrode area of the PEH, m=0.2 kg is measured by using a laboratory balance, Δt = 0.2 sec is the estimated average time variation between the two consecutive voltage peaks, h = 0.08 m and g = 9.8 N/kg.

Therefore, these values evaluates the input force, F~3.21 N which leads to the contact pressure, σ ~ 4.45 kPa.

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