SUPPORTING INFORMATION

Poly(vinylidene fluoride-trifluoroethylene)-ZnO Nanoparticle Composites on a Flexible Poly(dimethylsiloxane) Substrate for Energy Harvesting

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TABLE OF CONTENTS

LIST OF TABLES

S.1 Output Voltage comparison- finger assisted tapping

The generated output voltage from Device 1, Device 2 and Device 3 under finger assisted tapping is as indicated in table S1 and figure S1

Table S1. Voltage output comparison of energy generating devices under irregular finger assisted tapping

Device	Maximum Output voltage (V)	Maximum peak to peak voltage (V)
Device 1: P(VDF-TrFE)	0.84	0.99
Device 2: P(VDF-TrFE)/ZnO	1.74	1.97
Device 3: P(VDF-TrFE)/ZnO+EGO	2.27	3.47

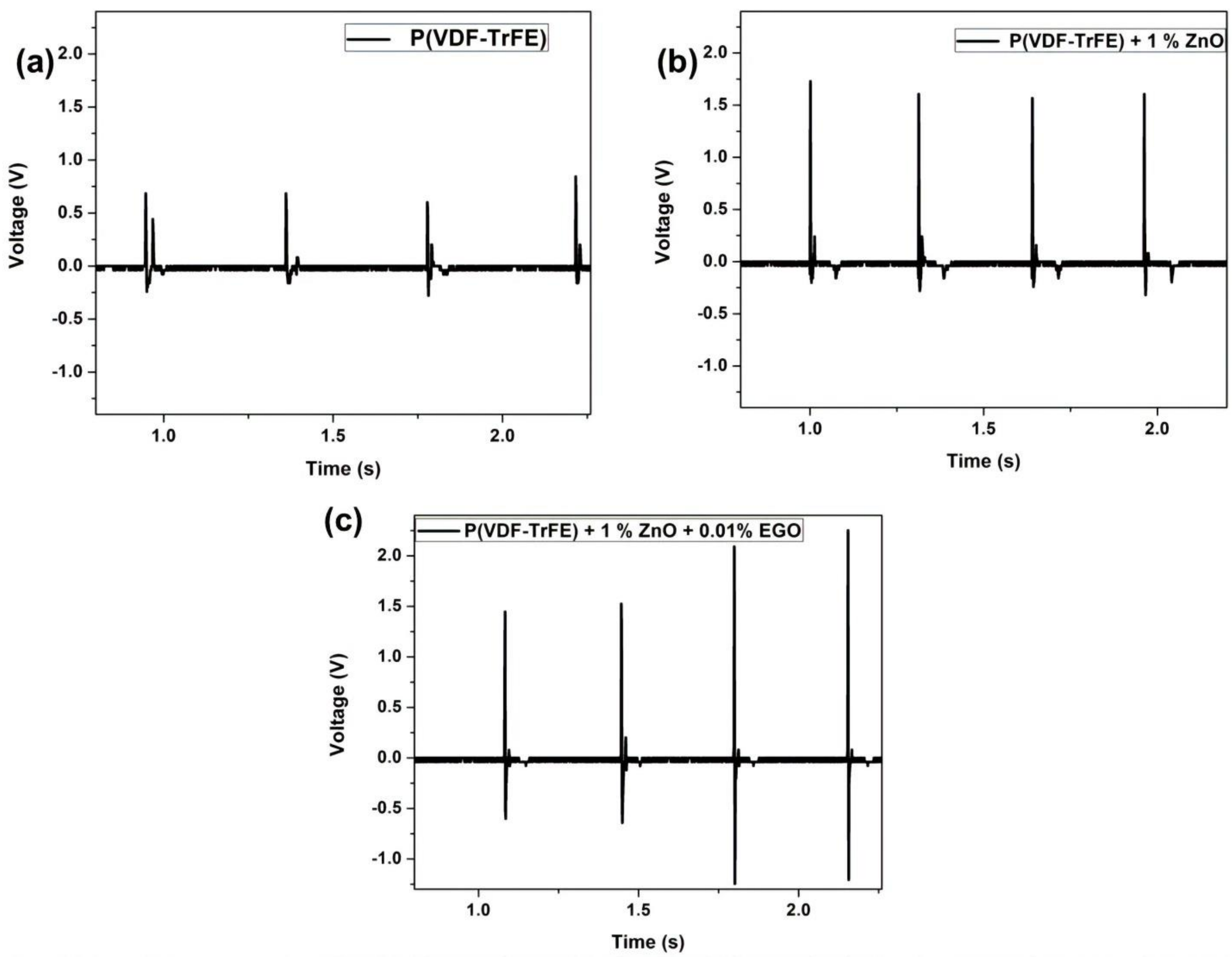

Figure S1: Voltage generated by finger assisted tapping (a) P(VDF-TrFE) (b) P(VDF-TrFE) + 1% ZnO (c) P(VDF-TrFE) + 1% ZnO + 0.01% EGO

S.2 Current characteristics of hybrid device under finger assisted tapping

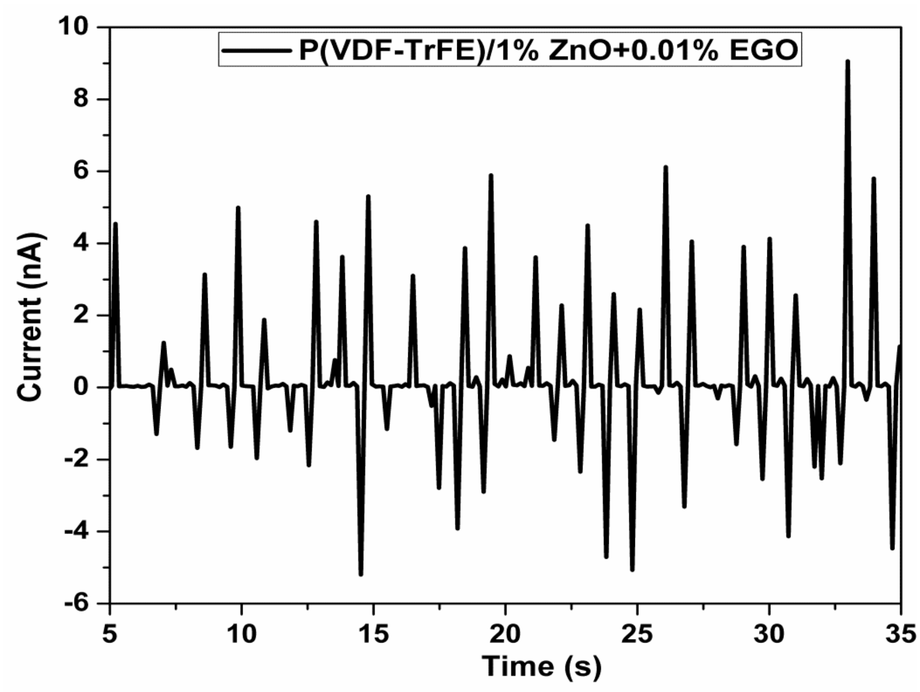

Figure S2 Current generated from hybrid device under finger assisted tapping

S.3. Force Sensitive Resistor (FSR)

FSR was employed to identify the applied pressure on PNEG, qualitative as well as quantitative force calculations during the output voltage measurements were carried out. Force measured depends on the resistance of the FSR, resistance of FSR decreases with increase in force applied.

Circuit diagram

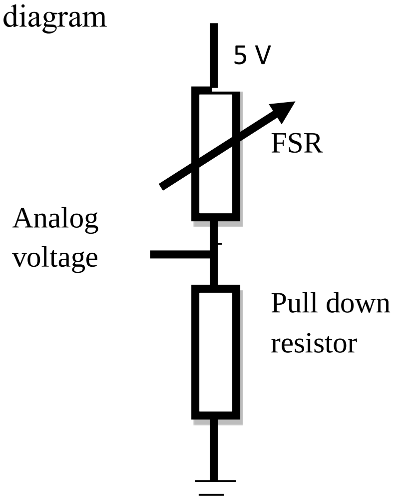

Figure S3 Circuit diagram of FSR

Table S3a Calibration of FSR for various force (R is the resistance value of pull down network)

Force (N)	FSR Resistance (K Ω)	(FSR + R) (K Ω)	Current through FSR+R (mA)	Voltage across R (V)
None	Infinite	Infinite!	0	0
0.2	30	40	0.13	1.3
1	6	16	0.31	3.1
10	1	11	0.45	4.5
100	0.250	10.25	0.49	4.9

Program

Qualitative Approach

```
int fsrPin = 0;     // the FSR and 10K pulldown are connected to a0
  int fsrReading;     // the analog reading from the FSR resistor divider
   void setup(void) {
   // We'll send debugging information via the Serial monitor
   Serial.begin(9600);
 }
 void loop(void) {
   fsrReading = analogRead(fsrPin);
   Serial.print("Analog reading = ");
   Serial.print(fsrReading);     // the raw analog reading

   if (fsrReading < 10) {
     Serial.println(" - No pressure");
   } else if (fsrReading < 200) {
     Serial.println(" - Light touch");
   } else if (fsrReading < 500) {
     Serial.println(" - Light squeeze");
   } else if (fsrReading < 800){
     Serial.println(" - Medium squeeze");
   } else {
     Serial.println(" - Big squeeze");
   }
   delay(1000);}
```

Calibration of force using FSR with respect to various RPM

Table S3b. Calibration of force using FSR with respect to various RPM of universal vibration apparatus

RPM	Voltage range across R (V)	Force range (N)
230	1.0-2.7	0-1
240	2.7-3.4	1-2
250	2.7-3.8	1-3
260	2.7-3.9	1-4
270	2.7-4.01	1-5

Program

Quantitative approach

```
int fsrPin = 0;     // the FSR and 10K pulldown are connected to a0

int fsrReading;     // the analog reading from the FSR resistor divider

int fsrVoltage;     // the analog reading converted to voltage

unsigned long fsrResistance;  // The voltage converted to resistance, can be very big so make "long"

unsigned long fsrConductance;

long fsrForce;       // Finally, the resistance converted to force


void setup(void) {

  Serial.begin(9600);   // We'll send debugging information via the Serial monitor

}

void loop(void) {

  fsrReading = analogRead(fsrPin);

  Serial.print("Analog reading = ");

  Serial.println(fsrReading);
```

```
// analog voltage reading ranges from about 0 to 1023 which maps to 0V to 5V (= 5000mV)
fsrVoltage = map(fsrReading, 0, 1023, 0, 5000);
Serial.print("Voltage reading in mV = ");
Serial.println(fsrVoltage);

if (fsrVoltage == 0) {
  Serial.println("No pressure");
} else {
  // The voltage = Vcc * R / (R + FSR) where R = 10K and Vcc = 5V
  // so FSR = ((Vcc - V) * R) /
  fsrResistance = 5000 - fsrVoltage;     // fsrVoltage is in millivolts so 5V = 5000mV
  fsrResistance *= 10000;                // 10K resistor
  fsrResistance /= fsrVoltage;
  Serial.print("FSR resistance in ohms = ");
  Serial.println(fsrResistance);

  fsrConductance = 1000000;           // we measure in micromhos so
  fsrConductance /= fsrResistance;
  Serial.print("Conductance in microMhos: ");
  Serial.println(fsrConductance);
  // Use the two FSR guide graphs to approximate the force
  if (fsrConductance <= 1000) {
    fsrForce = fsrConductance / 80;
    Serial.print("Force in Newtons: ");
    Serial.println(fsrForce);
```

```
  } else {
    fsrForce = fsrConductance - 1000;
    fsrForce /= 30;
    Serial.print("Force in Newtons: ");
    Serial.println(fsrForce);
  }
 }
 Serial.println("--------------------");
 delay(1000);
```

S-4. Supporting Movies

Supporting Movie 1. Video showing output voltage of PNEG through irregular mechanical stress applied on the top electrode by human finger tapping.
Supporting Movie 2. Video showing output voltage of PNEG by mechanical tapping.
Supporting Movie 3. Video showing storage of voltage generated from PNEG into a 220 μF capacitor.