Electronic Supplementary Material (ESI) for Nanoscale


# Enhanced piezoresponse of electrospun PVDF mats with a touch Nickel Chloride hexahydrate salt

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## S1. Experimental Section

### Dynamic strain sensor

The Wheatstone bridge circuit was used for the measurement of strain with one of the arms as strain gauge and others with matching fixed resistors. The Wheatstone bridge signal was further amplified with dedicated strain gauge amplifier circuit with a gain of 100. The amplified strain gauge signal was connected to a digital storage oscilloscope. The measurement of the strain values was done using Whetstones bridge equation. The sample and strain gauge were pasted back to back surface one above the other at fixed end of the scale. The dimension of the each sample was about 10 x 10 $mm^2$ with the thickness of about 0.1mm. For electrical contacts the sample was sandwiched between two conductive copper tapes. The length and dimensions of the copper electrodes were exactly equal. The signal of the sample was given to oscilloscope for measurement and recording of data. The force was applied to the free end of the scale which generated mechanical vibrations along the length of the scale. The piezoresponse was recorded using storage oscilloscope.

The Wheatstone bridge equation, for single element is used calculating the strain values.

$$\varepsilon = \frac{\Delta R/R}{GF}$$ where R = resistance and GF = gauge factor

$$\varepsilon = \frac{4Vr}{GF\,(1 + 2Vr)}$$ where $V_r = V_{out} / V_{in}$, $V_{out}$ = outpout voltage

$V_{in}$ = Excitaion voltage given to the bridge

**S2: Circuit for Charging of capacitor and lighting LED**

The following full wave bridge rectifier circuit was used for charging of the capacitor and lighting of the LED.

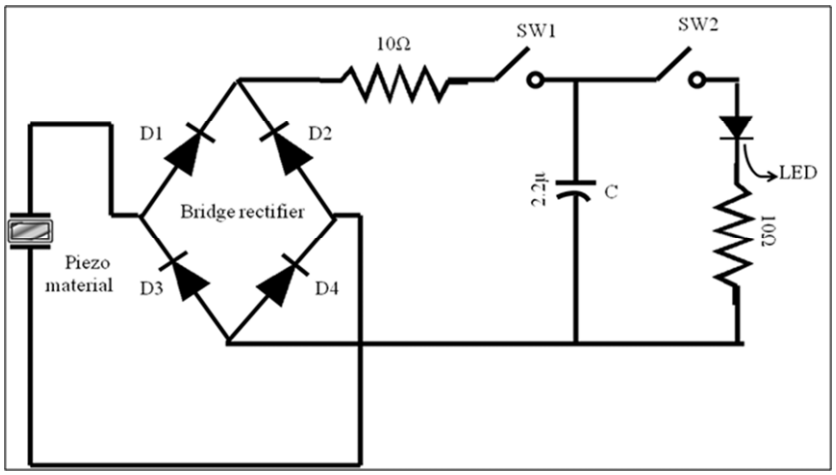


**Figure: Circuit diagram for Charging of capacitor and lighting LED**

The AC voltage generated by piezo device is converted into DC voltage by using a bridge rectifier circuit and is used for charging the capacitor. The above figure shows the circuit used for charging of the capacitor. The switch SW1 is closed and switch SW2 is kept open initially during charging of the capacitor. Then the charged capacitor is connected with LED by closing switch SW2 to light it. It takes about 6 minutes to charge the capacitor to a voltage required for lighting LED.