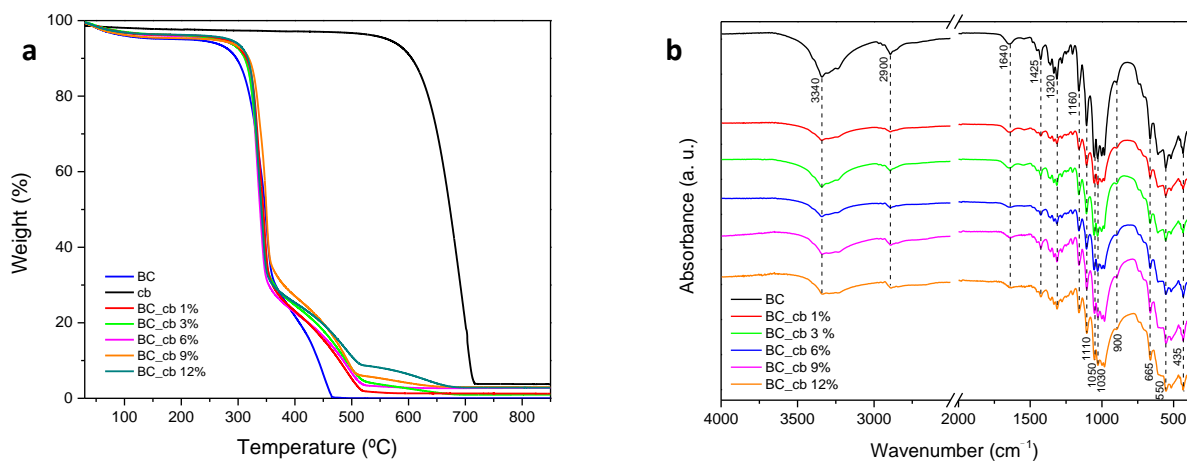
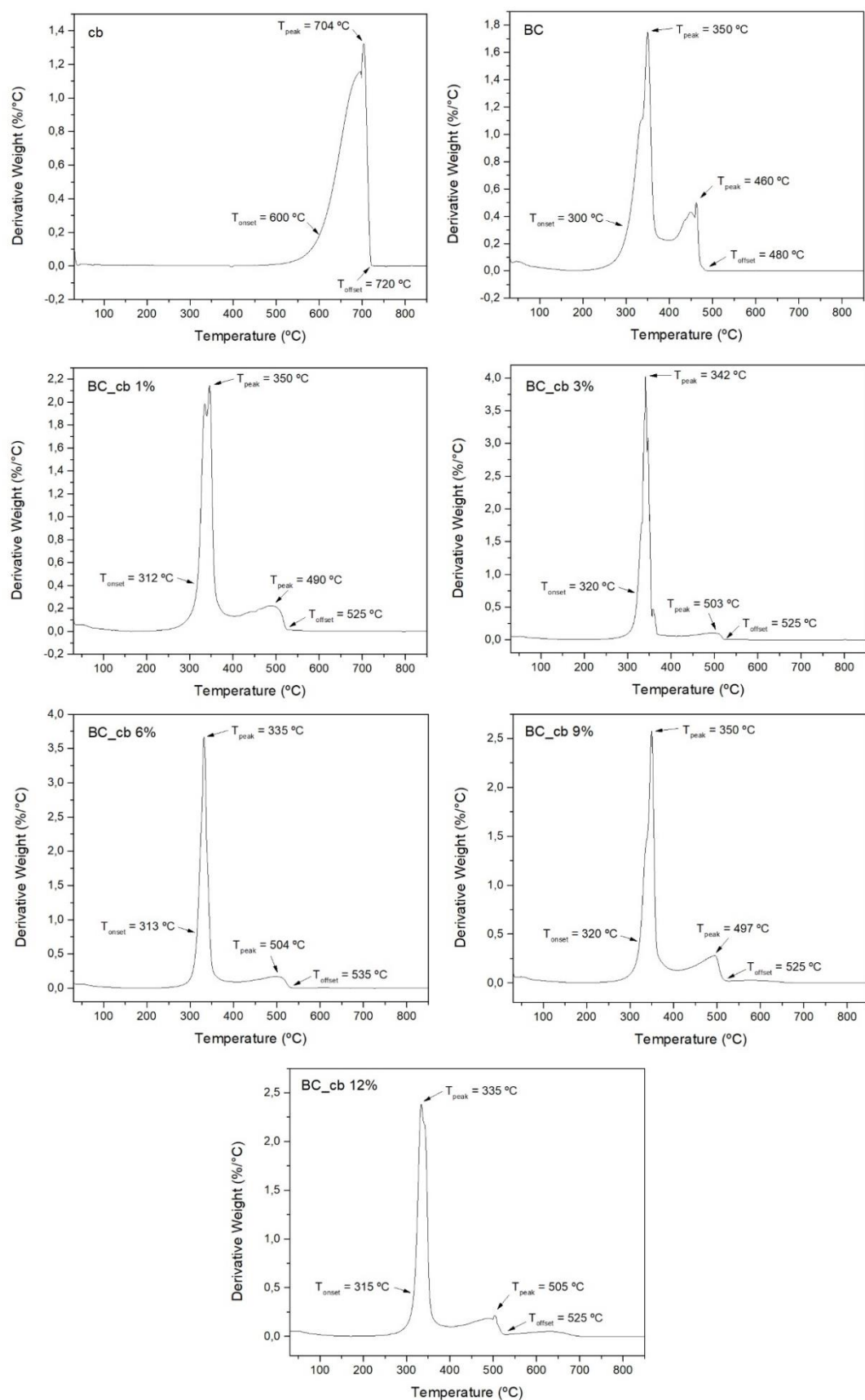


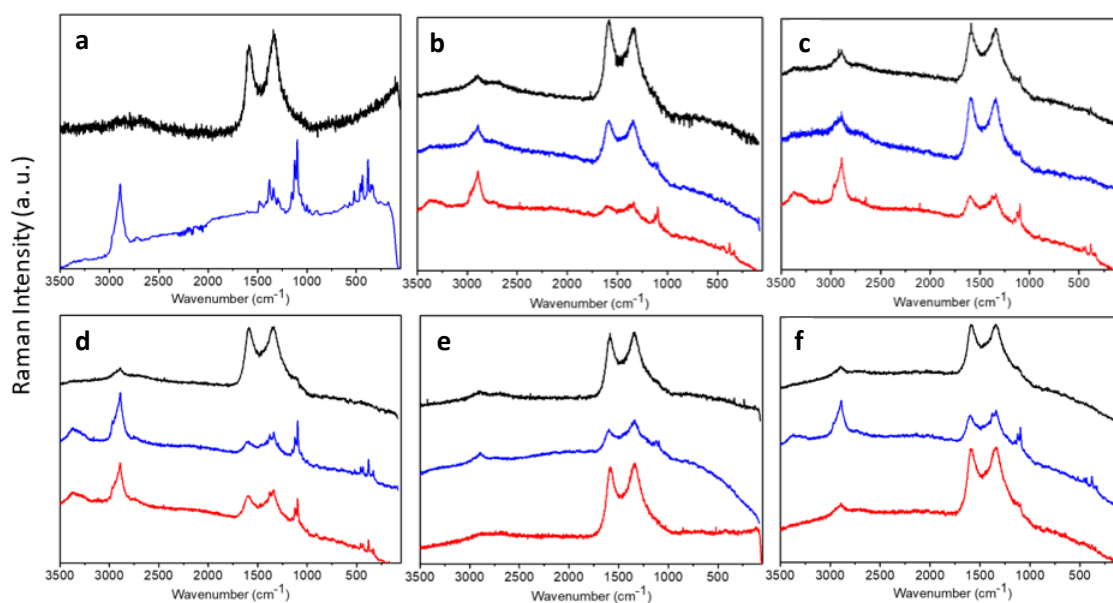
# Metal-Free, Bio-Triboelectric Nanogenerator Based on a Single Electrode of Bacterial Cellulose Modified with Carbon Black



**Figure S1.** (a) TGA curves and (b) FTIR spectrum for pristine BC and BC/carbon black with relative carbon black content of 1, 3, 6, 9, and 12 wt%.



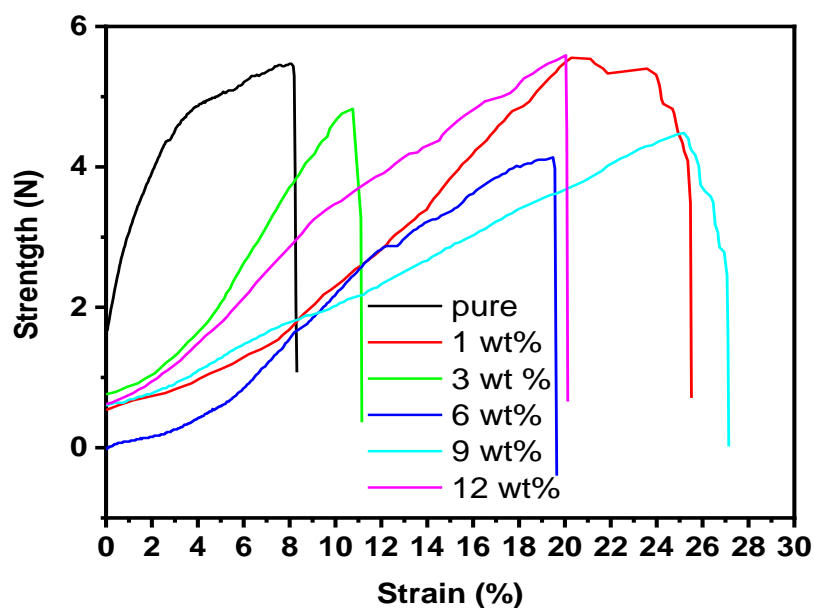
**Figure S2.** DTG curves of pristine BC and at increasing concentrations of conductive filler (carbon black) BC – 1 wt%, BC – 3 wt%, BC – 6 wt%, BC – 9 wt%, and BC – 12 wt%.



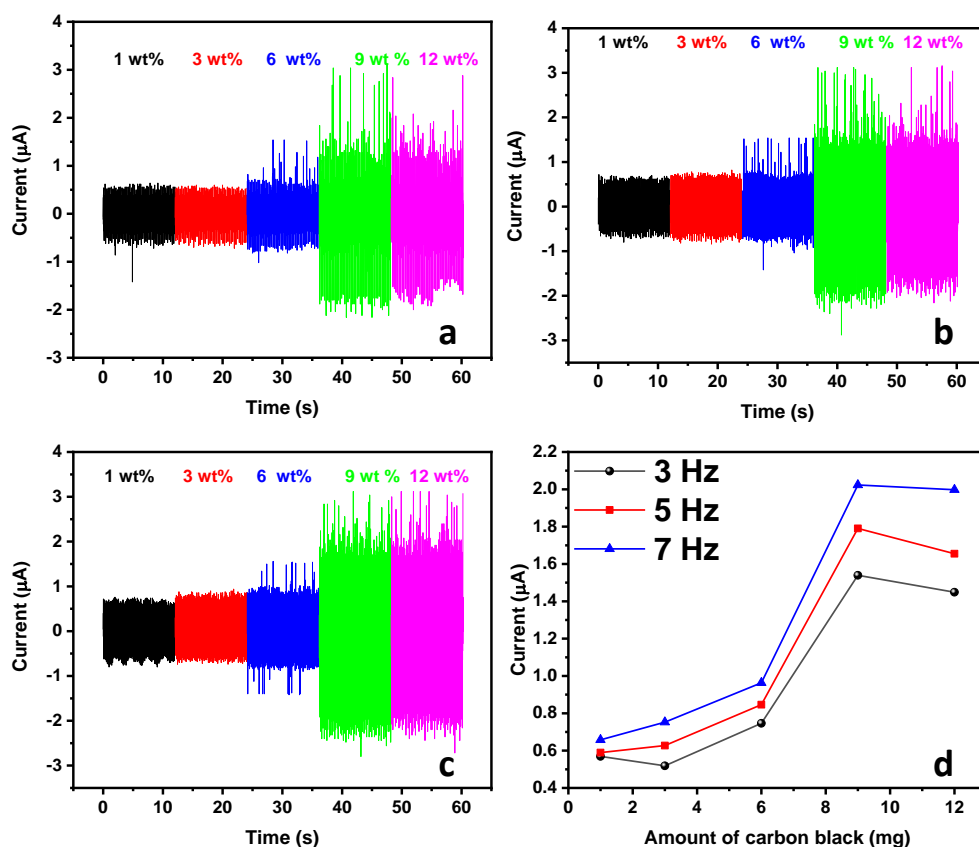
**Figure S3.** Raman spectra (a) Carbon black (black), BC (blue), (b) BC\_cb 1%, (c) BC\_cb 3%, (d) BC\_cb 6%, (e) BC\_cb 9% and BC\_cb 12%. (b) to (f) at three different positions over the sample surface.

**Table S1.** Intensity ratio between carbon D and G bands.

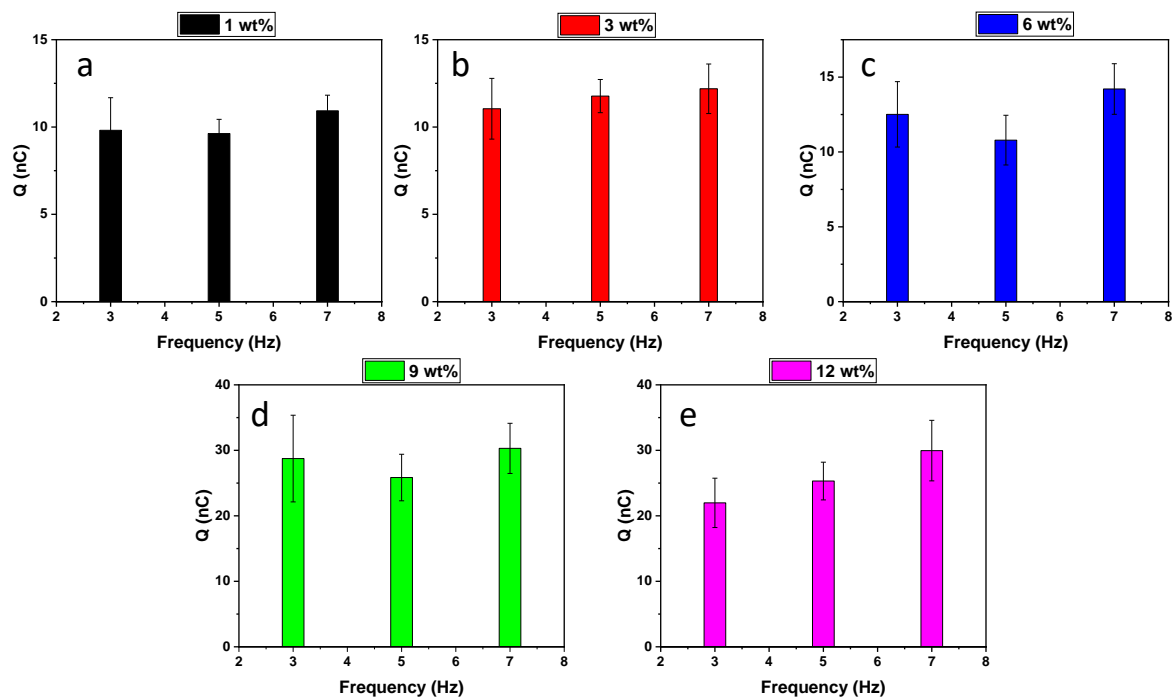
Material	I <sub>D</sub>	I <sub>G</sub>	Intensity ratio (I <sub>D</sub> /I <sub>G</sub> )
<b>Carbon black</b>	57	51	1.118
<b>BC_cb 1% point 1</b>	198	194	1.021
<b>BC_cb 1% point 2</b>	189	164	1.152
<b>BC_cb 1% point 3</b>	72	50	1.440
<b>BC_cb 3% point 1</b>	148	142	1.042
<b>BC_cb 3% point 2</b>	140	136	1.029
<b>BC_cb 3% point 3</b>	122	97	1.258
<b>BC_cb 6% point 1</b>	314	295	1.064
<b>BC_cb 6% point 2</b>	103	68	1.515
<b>BC_cb 6% point 3</b>	167	103	1.621
<b>BC_cb 9% point 1</b>	179	172	1.041
<b>BC_cb 9% point 2</b>	233	179	1.302
<b>BC_cb 9% point 3</b>	217	194	1.119
<b>BC_cb 12% point 1</b>	333	329	1.012



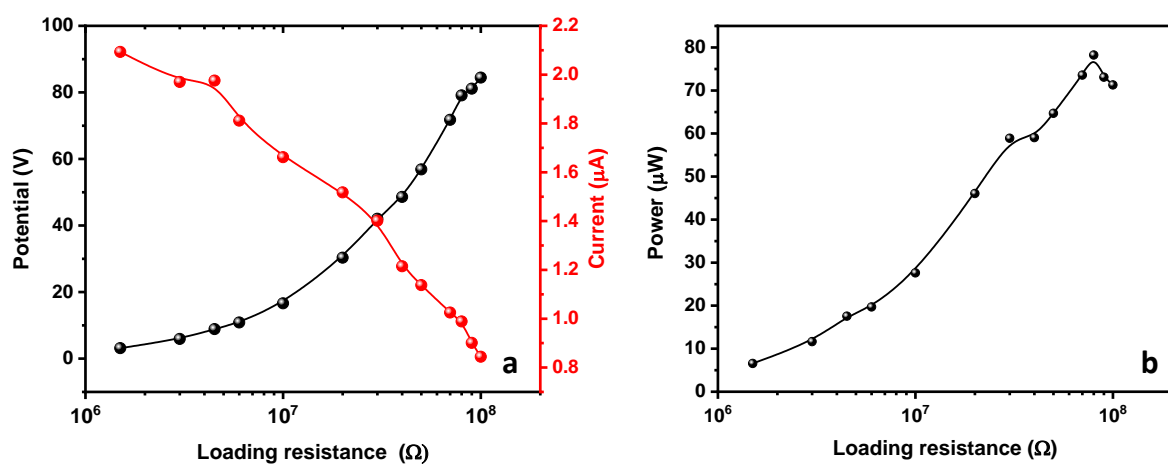
**Figure S4.** Stress-strain curves for electrodes of bacterial cellulose prepared at increasing content of carbon black



**Figure S5.** Short circuit current for bio-TENG of modified bacterial cellulose at increasing content of additive filler and excited at 3 Hz (a), 5 Hz (b), and 7 Hz (c); and the medium of peaks as a function of additive content and frequency of operation (d).



**Figure S6.** Transferred charge per cycle calculated from short circuit current of different devices ((a) 1 wt%, (b) 3 wt%, (c) 6 wt%, (d) 9 wt%, (e) 12 wt%) at different frequencies of operation.



**Figure S7.** (a) Overall dependence of the voltage output and current as a function of the loading resistance, and (b) corresponding variation in the power output for the bio-TENG.