

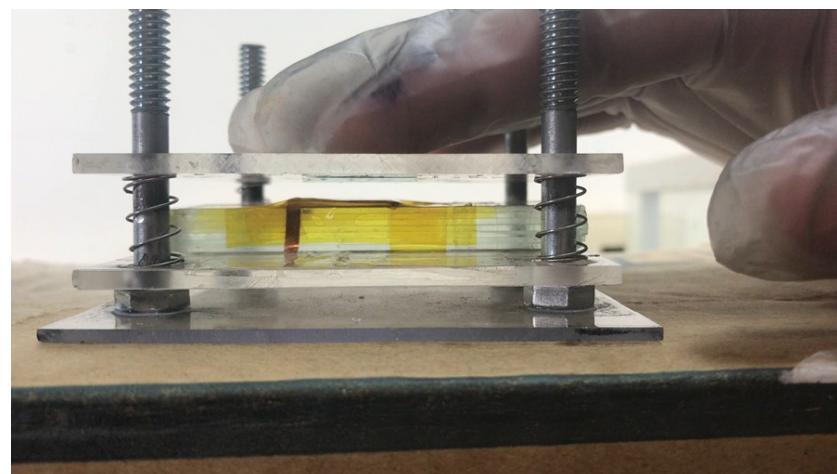
## Supplementary Information

### Enhanced output performance and stability of triboelectric nanogenerators by employing silane-based self-assembled monolayers

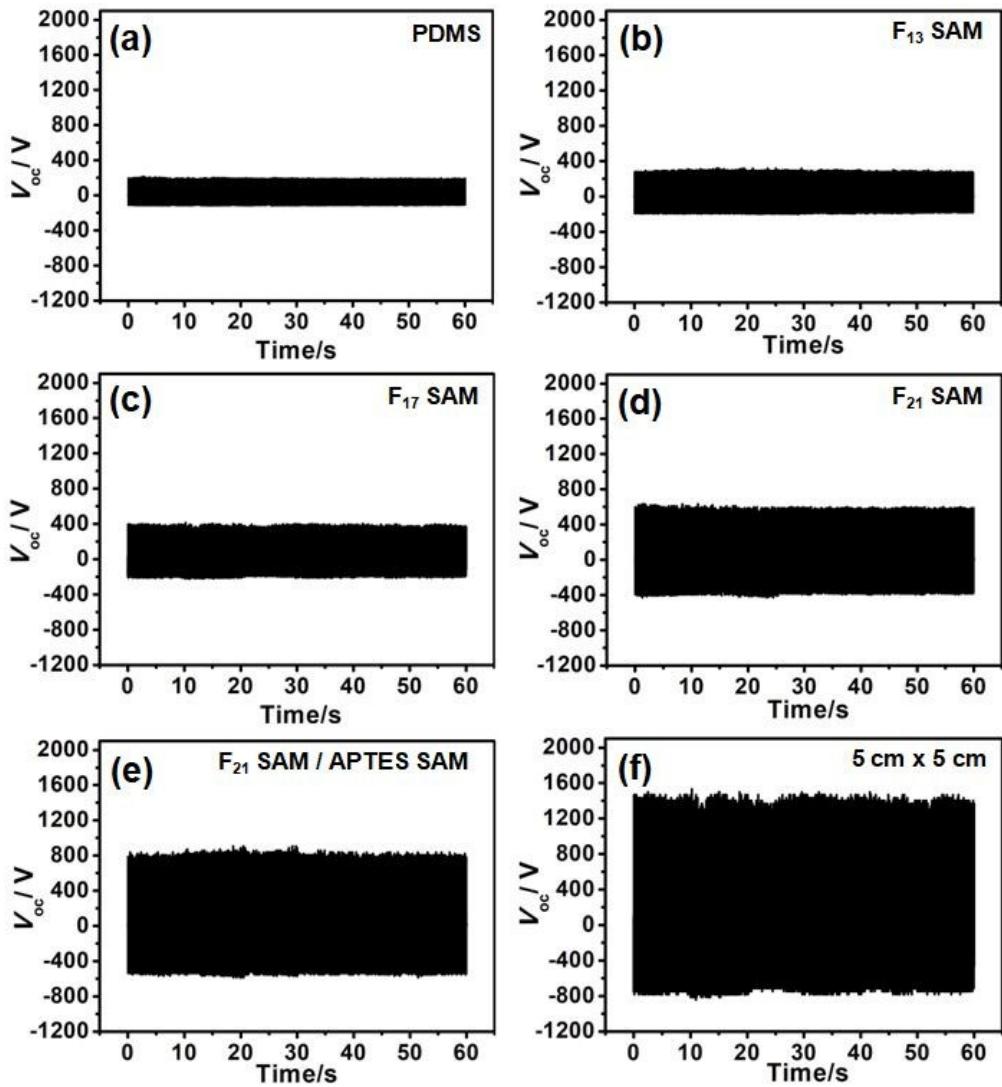
Chun-Chieh Wang and Chih-Yu Chang\*

*Department of Material Science and Engineering, National Taiwan University of Science and Technology, Taipei10607, Taiwan*

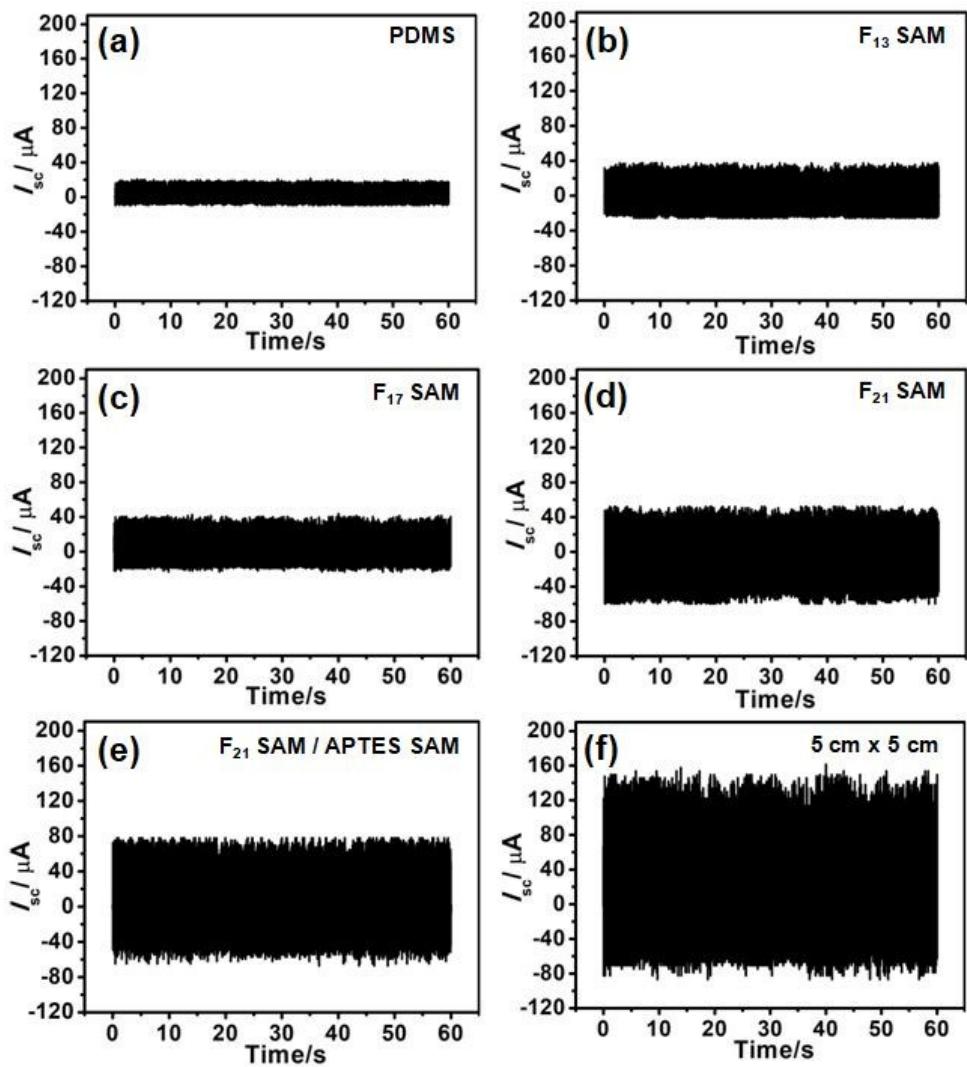
*E-mail:* [cychang@gapps.ntust.edu.tw](mailto:cychang@gapps.ntust.edu.tw)



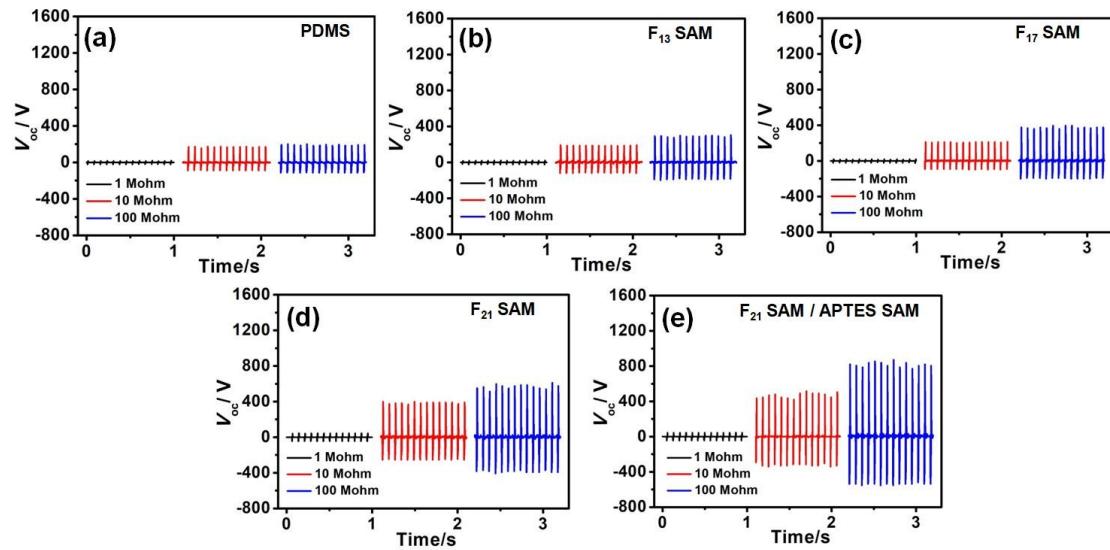
**Figure S1.** The photograph of the fabricated TENG.



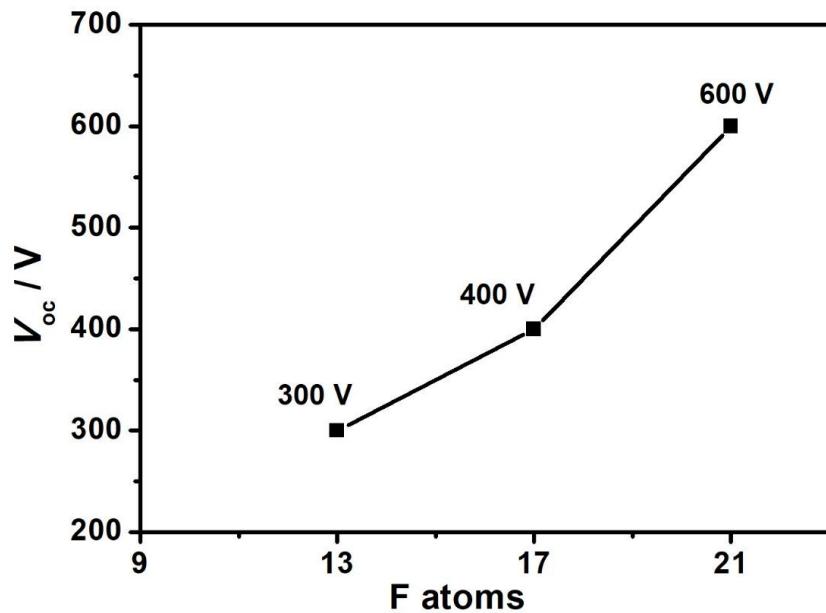
**Figure S2.** The  $V_{oc}$  output of TENG (2 cm x 2 cm): (a) without SAM modification; (b) with  $F_{13}$  SAM; (c) with  $F_{17}$  SAM; (d) with  $F_{21}$  SAM; (e) with  $F_{21}$  SAM and APTES SAM. (f) The  $V_{oc}$  output of TENG (5 cm x 5 cm) based on  $F_{21}$  SAM and APTES SAM modification.



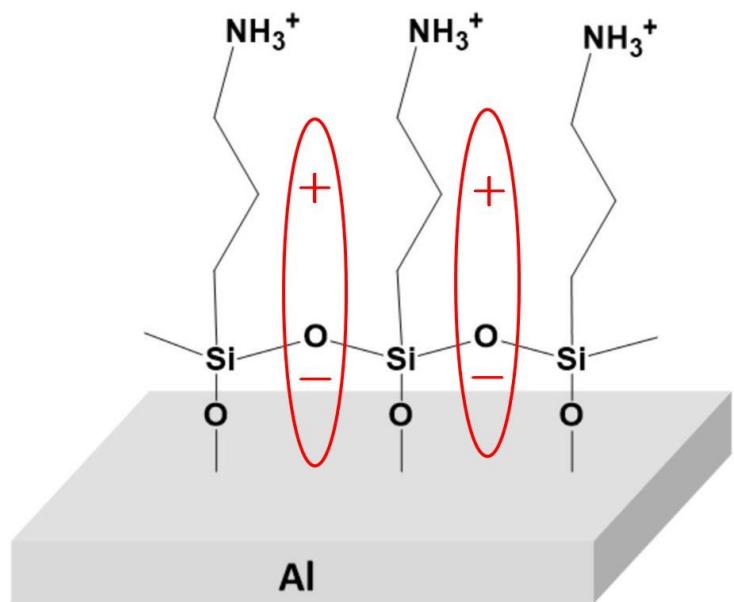
**Figure S3.** The  $I_{sc}$  output of TENG (2 cm x 2 cm): (a) without SAM modification; (b) with  $F_{13}$  SAM; (c) with  $F_{17}$  SAM; (d) with  $F_{21}$  SAM; (e) with  $F_{21}$  SAM and APTES SAM. (f) The  $I_{sc}$  output of TENG (5 cm x 5 cm) based on  $F_{21}$  SAM and APTES SAM modification.



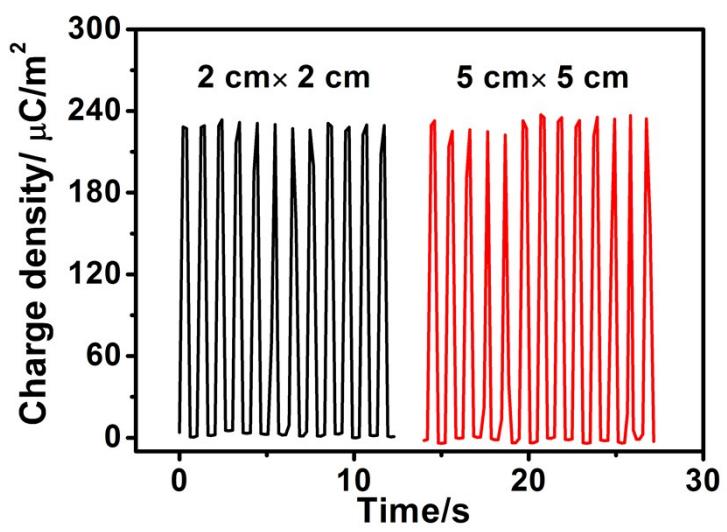
**Figure S4.** The  $V_{oc}$  output of TENG (2 cm x 2 cm) at different load resistances under an external pushing force of 20 N: (a) without SAM modification; (b) with  $F_{13}$  SAM; (c) with  $F_{17}$  SAM; (d) with  $F_{21}$  SAM; (e) with  $F_{21}$  SAM and APTES SAM.



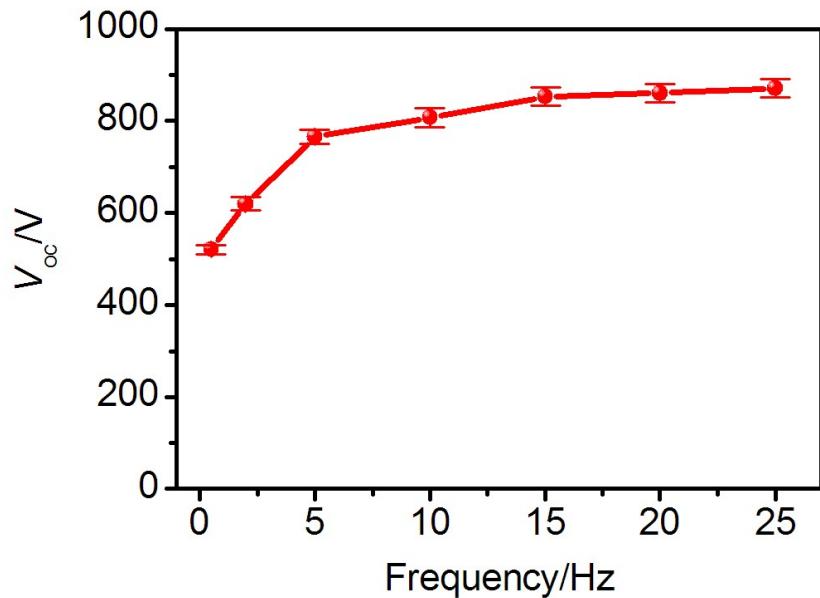
**Figure S5.** Dependency of the  $V_{oc}$  output of TENG on the number of fluorine atoms of SAM molecules.



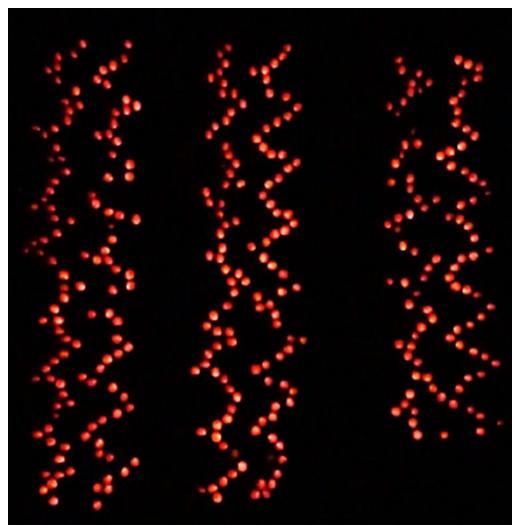
**Figure S6.** Schematic illustration of APTES SAM-modified Al layer.



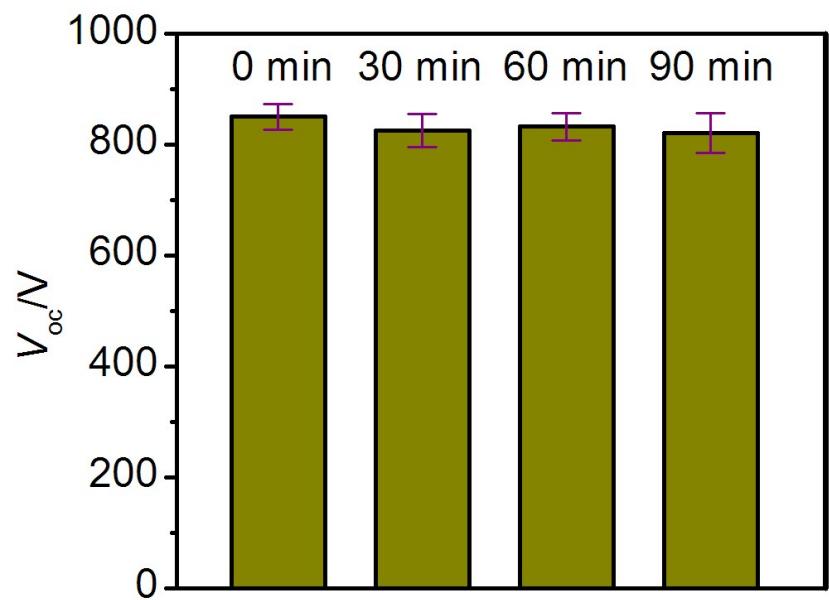
**Figure S7.** The charge density of the TENG based on F<sub>21</sub> SAM and APTES SAM modification (contact area = 2 cm x 2 cm or 5 cm x 5 cm).



**Figure S8.** The  $V_{oc}$  of the TENG (2 cm x 2 cm) under various frequencies from 0.5 to 25 Hz; the statistical data were collected from more than 5 samples.



**Figure S9.** The photograph of 353 LEDs that lit up simultaneously by the TENG (2 x 2 cm) based on  $F_{21}$  SAM and APTES SAM modification.



**Figure S10.** The  $V_{oc}$  output of the TENG based on  $F_{21}$  SAM and APTES SAM modification before and after immersion in water; the statistical data were collected from more than 5 samples.

**Table S1.** Surface potential properties of PDMS layer with and without fluorinated SAMs modification

	PDMS	F <sub>13</sub> SAM	F <sub>17</sub> SAM	F <sub>21</sub> SAM
Surface Potential (V)	-0.1	-1.01	-1.1	-1.36

**Table S2.** Surface potential properties of Al layer with and without APTES SAM modification.

	Al	APTES SAM
Surface Potential (V)	0.54	0.92

**Table S3.** Comparison of the characteristics of SAM-modified TENG previously reported as well as the present work.

	$V_{oc}$ (V)	$I_{sc}$ ( $\mu$ A)
Ref 1	105	27
Ref 2	560	38
Ref 3	520	44
Ref 4	330	108
This work	873	78

**Table S4.** Comparison of the characteristics of large-area TENG previously reported as well as the present work.

	<b>Area (cm x cm)</b>	<b><math>V_{oc}</math> (V)</b>	<b><math>I_{sc}</math> (<math>\mu</math>A)</b>
<b>Ref 5</b>	<b>5 x 5</b>	<b>35</b>	<b>0.44</b>
<b>Ref 6</b>	<b>10 x 10</b>	<b>404</b>	<b>44</b>
<b>Ref 7</b>	<b>7 x 7</b>	<b>368</b>	<b>78</b>
<b>Ref 8</b>	<b>6 x 5</b>	<b>210</b>	<b>45</b>
<b>This work</b>	<b>5 x 5</b>	<b>1469</b>	<b>150</b>

## Reference

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