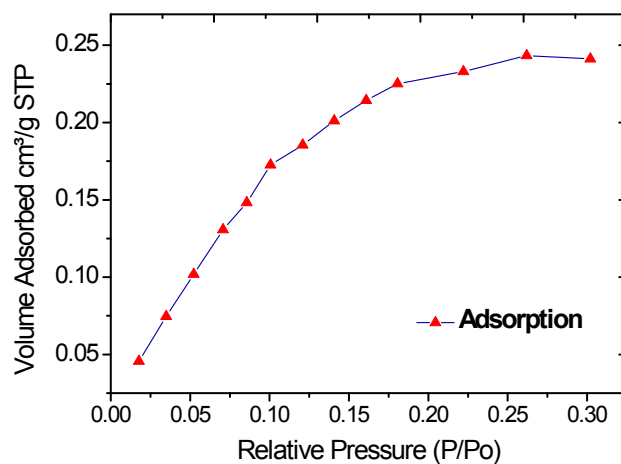


## Supporting information

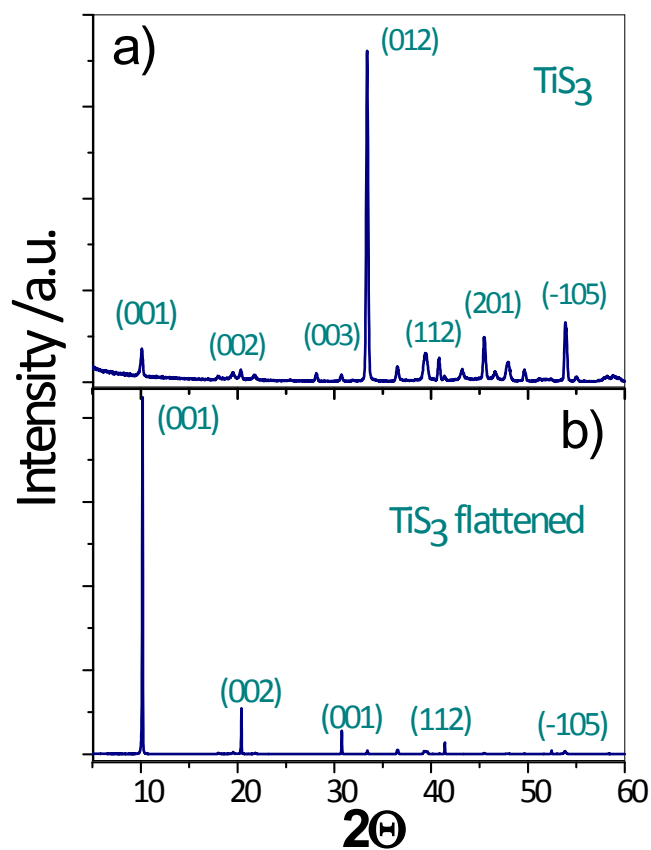
### - BET measurements

Results from  $\text{TiS}_3$  grown on Ti discs show a BET surface area of  $1.16 \pm 0.03 \text{ m}^2/\text{g}$ . To know real area of  $\text{TiS}_3$  nanoribbons, it is necessary to subtract the mass of the titanium substrate to the whole sample mass. Commonly smooth metallic surface (as that of Ti substrate) has around  $1.00 \pm 0.02 \text{ m}^2/\text{g}$ . Results show a  $\text{TiS}_3$  real area of  $67 \text{ m}^2/\text{g}$ . Porosity has not been found in this material. Figure 1 shows the isotherm of this measures.



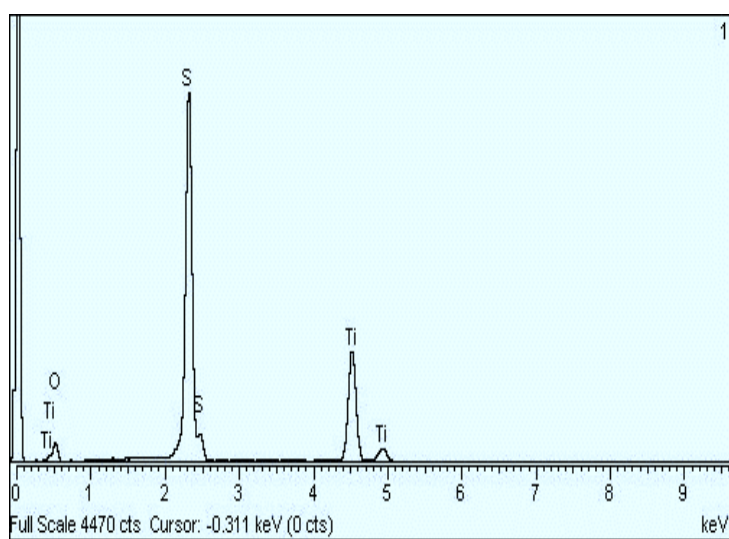
**Figure S1.** Experimental nitrogen adsorption of  $\text{TiS}_3$  nanoribbons at different relative pressure

- X-ray diffraction of  $\text{TiS}_3$  and  $\text{TiS}_3$  flattened.



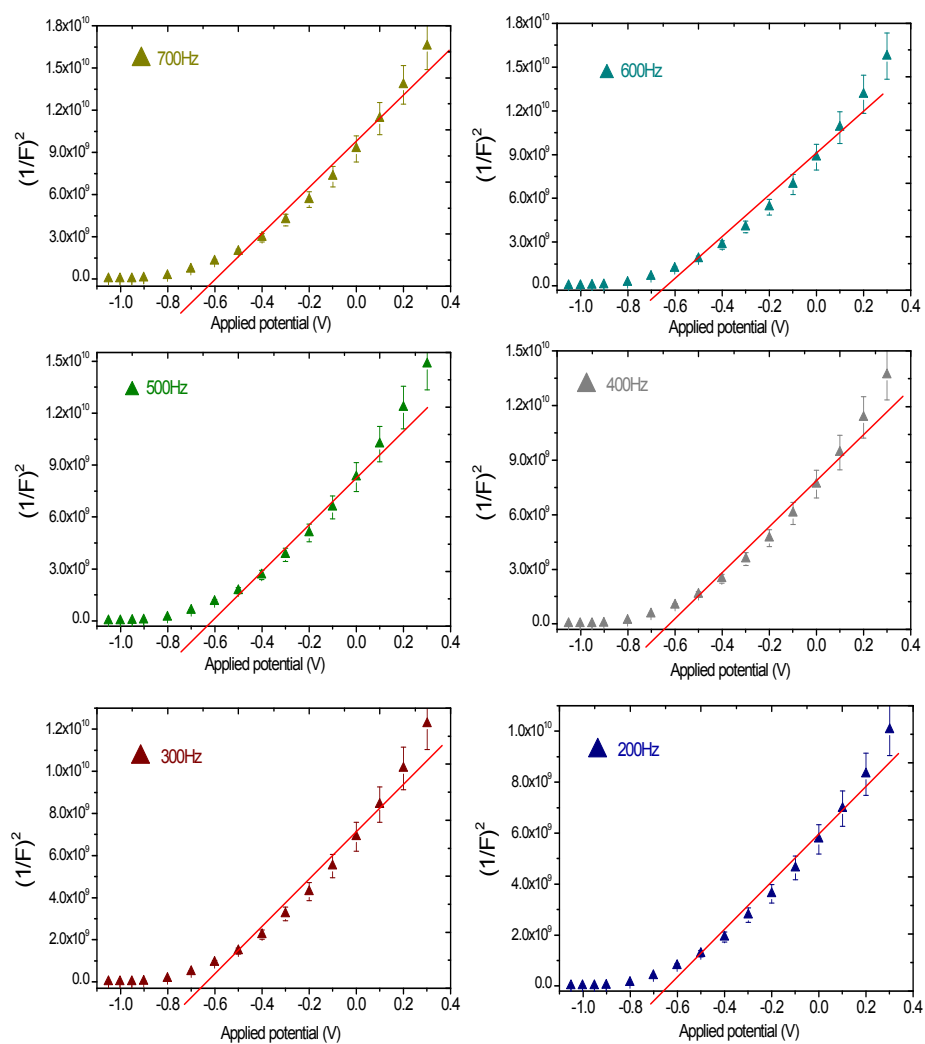
**Figure S2.** a) X-ray diffraction pattern of  $\text{TiS}_3$  nanoribbons and b) X-ray diffraction pattern of flattened  $\text{TiS}_3$ .

- EDX analysis



**Figure S3.** Results of EDX Analysis of  $\text{TiS}_3$  samples.

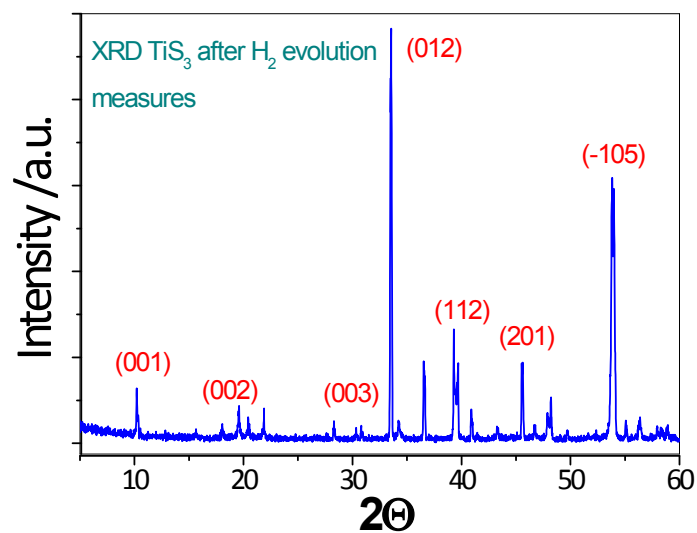
- Mott-Schottky plots at different frequencies



*Figure S4. Capacitance of  $\text{TiS}_3$  nanoribbons by EIS at different frequencies are indicated on the figures.*

- **Stability**

TiS<sub>3</sub> XRD pattern after hydrogen evolution process. It appears to be similar to that of TiS<sub>3</sub> before that process. It means that chemical changes and/or structural degradation have not been occurs.



*Figure S5. X-ray diffraction of TiS<sub>3</sub> samples after hydrogen generation experiments.*