Electronic Supplementary Material (ESI) for Nanoscale Advances.


# Supporting Information for

## High-efficient and simple synthesis of $Ti_3C_2T_x$ nanoscrolls by surface energy modulation and cryogenic freezing

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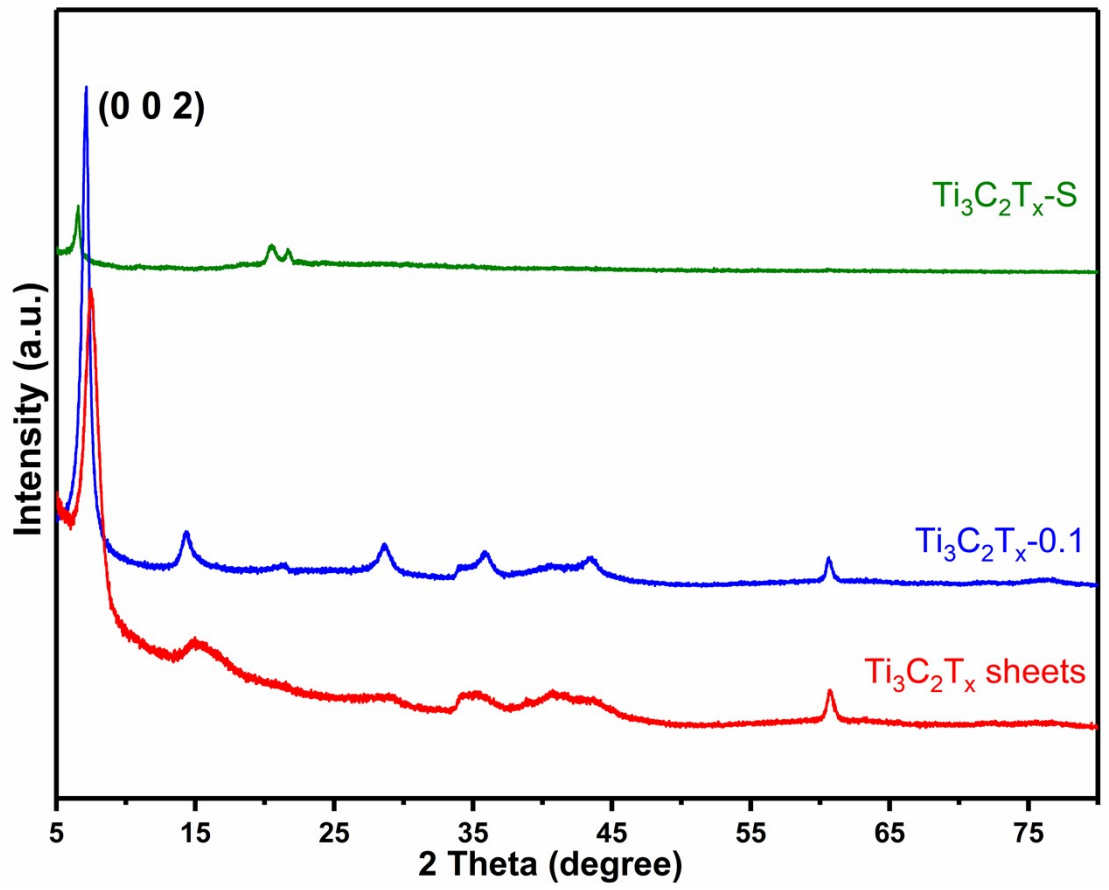


**Fig. S1.** XRD patterns of $Ti_3C_2T_X$ sheets, $Ti_3C_2T_X$-0.1 and $Ti_3C_2T_X$-S.

As shown in the XRD pattern (**Fig. S1)**, $Ti_3C_2T_x$ NSs are well prepared with a clear (002) crystal plane. After being frozen by liquid nitrogen and freeze-drying, the spacing between layers of $Ti_3C_2T_x$-0.1 becomes bigger because the (002) crystal plane shifts to lower angle than $Ti_3C_2T_x$ sheets.

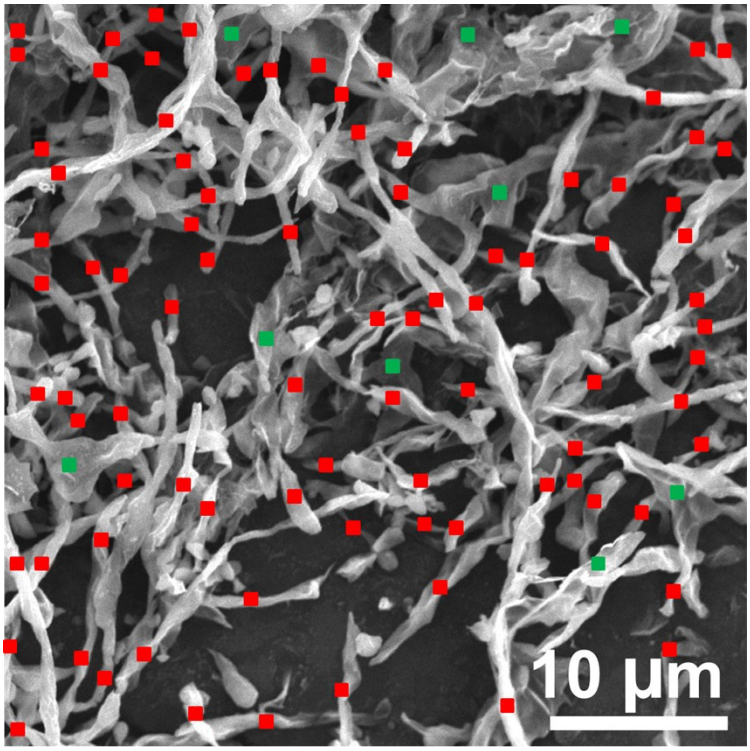


**Fig. S2.** SEM image of $Ti_3C_2T_X$-S after marked sheets (9 green cubes) and nanoscrolls (86 red cubes).

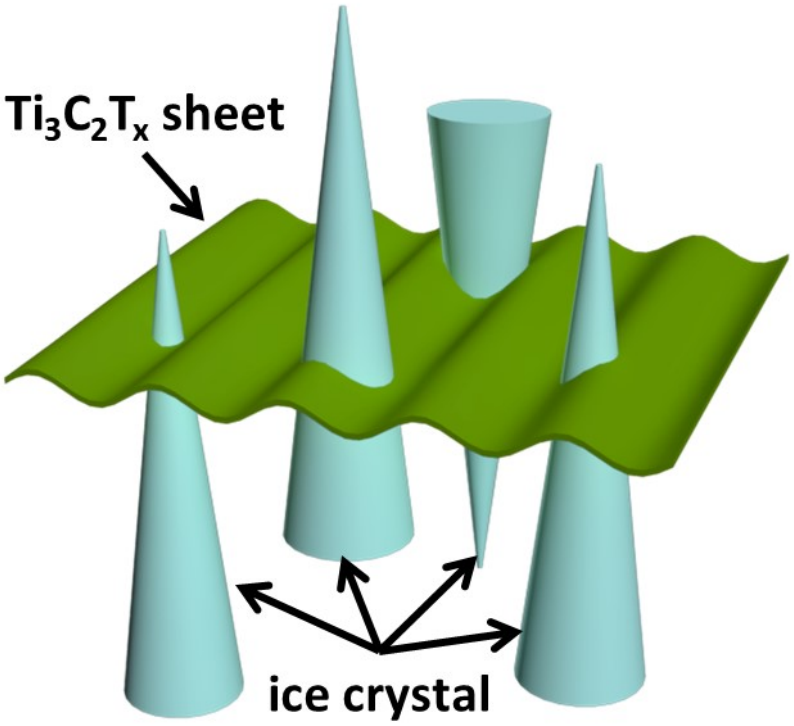


**Fig. S3** Schematic illustration of ice crystal growth in low-concentration $Ti_3C_2T_X$ dispersion when frozen by liquid nitrogen.

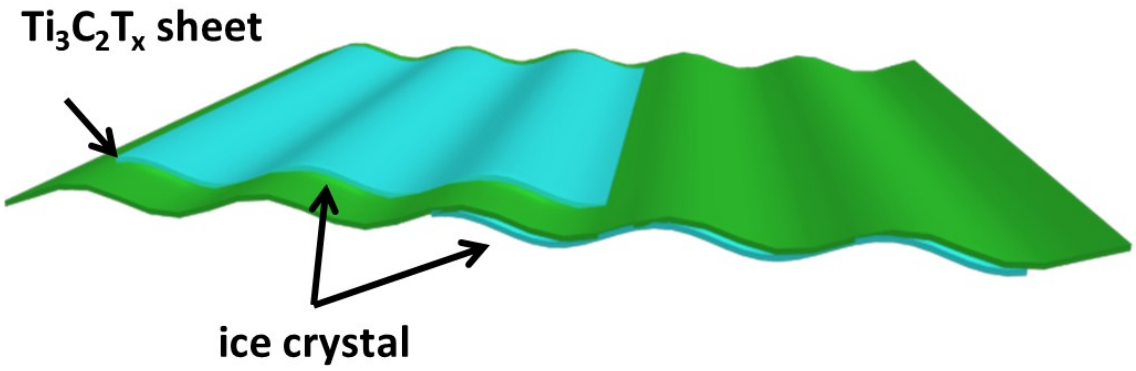


**Fig. S4** Schematic illustration of ice crystal growth in 0.1 g $mL^{-1}$ $Ti_3C_2T_X$ dispersion when frozen by refrigerator.

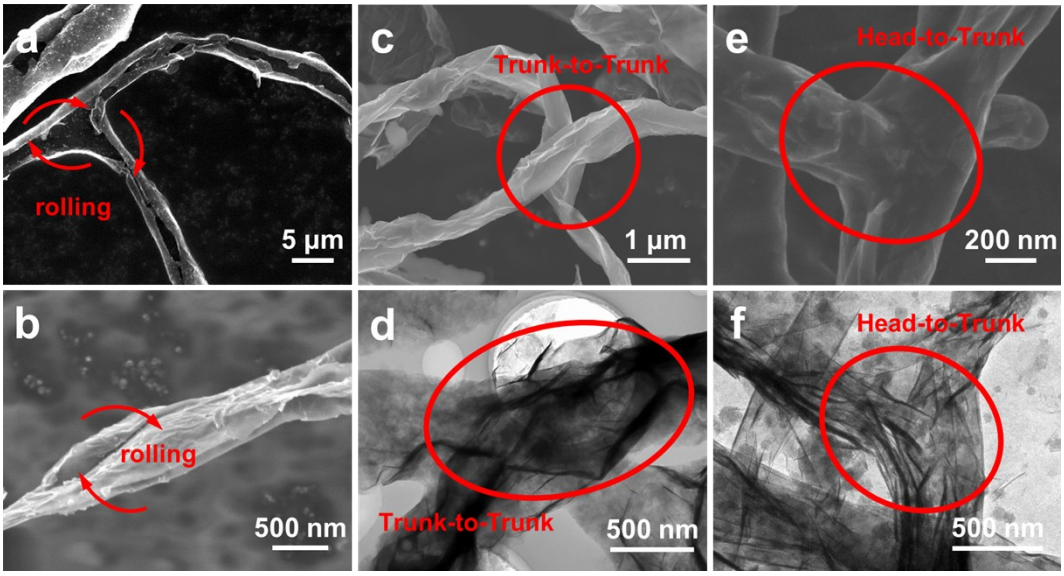


**Fig. S5** SEM images of (a) half roll-up structure and (b) roll-up structure in $Ti_3C_2T_x$-S; (c) SEM image and (d) TEM image of the trunk-to-trunk structure of $Ti_3C_2T_x$-S; (e) SEM image and (f) TEM image of the head-to-trunk structure of $Ti_3C_2T_x$-S.