

TECHNICAL DATA SHEET

NANOPLEXUS DELAMINATED MXENE ($Ti_3C_2T_x$), FEW-LAYER NANOFKAKES

Product Description

$Ti_3C_2T_x$ MXenes are a novel type of two-dimensional (2D) material composed of layered carbides of transition metals. MXenes are notable for their properties that combine aspects of both metals and ceramics. These include excellent thermal and electrical conductivity, heat resistance, and excellent volumetric capacitance, whilst having the highest EMI shielding effectiveness among similar synthetic 2D materials. MXenes have applications in advanced battery and energy storage technologies (e.g. supercapacitors), electromagnetic shielding, photocatalysis, optoelectronics, polymer nanocomposite fillers, and conductive coatings.

Product Name	Delaminated MXene ($Ti_3C_2T_x$), Few-Layer Nanoflakes
Product Number	MXNTI3C2TX
CAS Number (effective)	12363-89-2

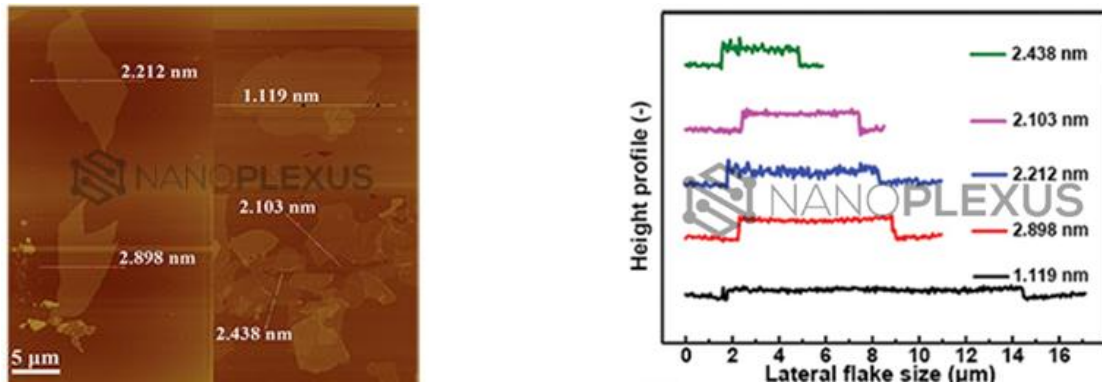
Characteristics

Test	Specification
Appearance (Form)	Flakes
Appearance (Colour)	Dark grey to Black
X-Ray Diffraction	Conforms to Structure
Carbon content ¹ (atomic %)	20.0 % - 30.0 %
Titanium content ¹ (atomic %)	30.0 % - 40.0 %
Oxygen content ¹ (atomic %)	15.0 % - 25.0 %
Other elements ^{1,2} (atomic %)	15.0 % - 25.0 %
Average thickness	1.0 nm – 3.0 nm
Average lateral size	1.0 μ m – 4.0 μ m

¹ Average values across random samples in a single batch

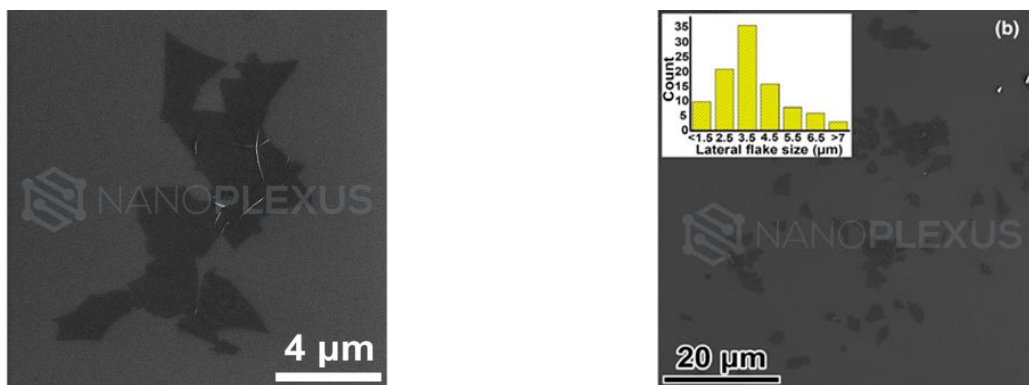
² includes Al, Cl, F, H

MXene Flake Thickness



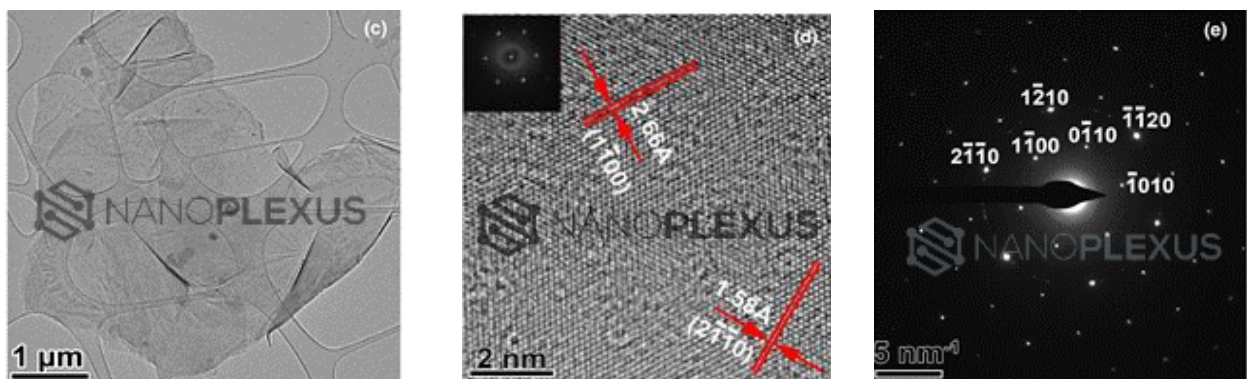
Atomic force microscopy demonstrating 1 to 3 layer MXene flakes with the largest flake size being 12.5 μm

MXene Lateral Flake Size

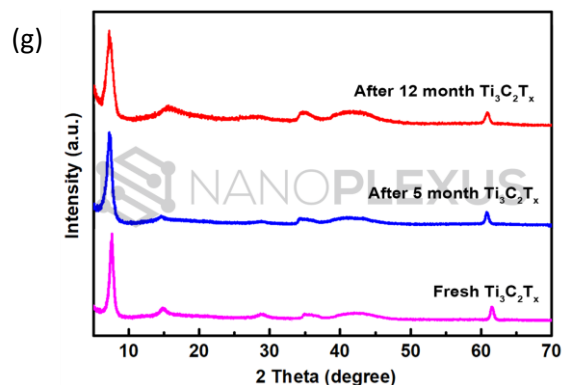
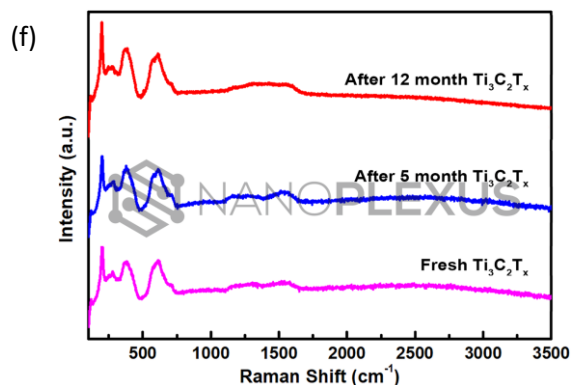


(a) SEM images of Ti₃C₂T_x flakes including the (b) distribution of the lateral flake size

Further MXene Flake Characterisation



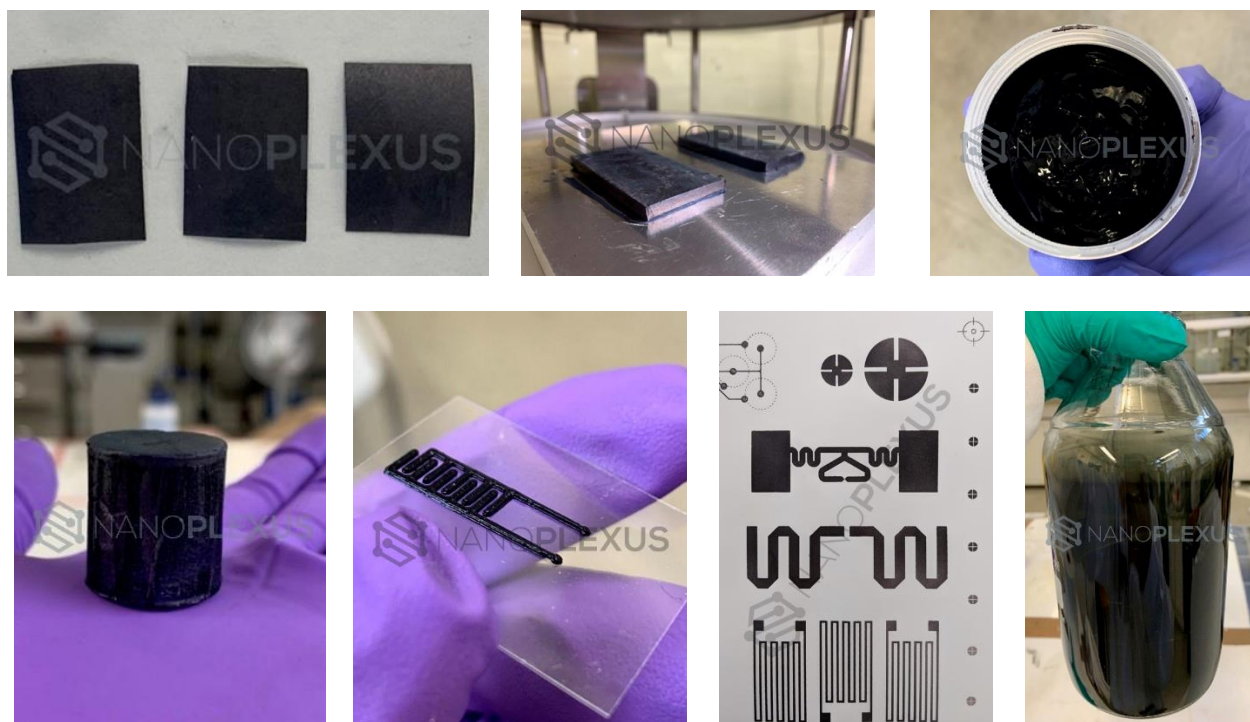
(c) Low magnification TEM image showing a single flake of MXene; (d) HRTEM (high-resolution TEM) and (e) SAED patterns of the delaminated Ti₃C₂T_x flakes



(f) Raman spectroscopy* & (g) X-Ray diffraction (XRD) of delaminated MXene flakes*

* MXene samples stored in ideal condition – low humidity in a desiccator at 3°C

Potential Applications of Nanoplexus' MXene Flakes



Clockwise from top-left: MXene films (10 μ m thickness); MXene composite panels; MXene inks; MXene dispersion in water; Screenprinting of MXene on PET; Inter-digitated electrodes (printed via direct-ink writing method of aqueous MXene inks); MXene foam/aerogels (40mg/cm³)

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