

# Thermogravimetric Analysis (TGA) of freeze-dried MXene - TA Q500

Date: 2020-02-27

Tags: 07/10/2019Synth Oxidation TGA TAQ500

Created by: James Bird

1 / 2

**Goal : Perform TGA of powder  $\text{Ti}_3\text{C}_2$  MXene to comprehend its thermal stability of terminating groups and core structure**

**Procedure :**

- Submit  $\text{Ti}_3\text{C}_2$  MXene, synthesised in [\[Experiment\] MXene synthesis III](#), and freeze-dried ten days later (see [\[Experiment\] Differential Scanning Calorimetry \(DSC\) - Freeze-dried MXene powder](#))
- Three samples loaded into platinum pans without lids
- Samples masses were 1.115, 1.729 and 3.674 mg for Run #1-3, respectively
- Sample purge flow set at 90 mL/min of Argon and balance gas flow at 10 mL/min of Nitrogen on TA Instruments TGA Q500
- Ramp rate of 10K/min from room temperature to 900 °C

**Results :**

Samples ran nearly 5 months after synthesis, so oxidation anticipated - powder sample had been stored in non-ideal conditions (in air at room temperature) since it was removed from the freeze-drier on 20/10/2019 ( ~ 4 months earlier). Masses input as negative values for Runs #1 & 3 hence data conversion required.

.### files are raw outputs from TA Instruments Universal Analysis 2000 software package, .txt files are the same data exported in a human-readable and columnar format and the .png file is a plot of the data where mass changes are plotted as percentages (with corrections made for starting masses input as negative values) against temperature.

**Conclusions:**

To ensure sample purity, analyses should be performed much quicker after initial synthesis, and storage conditions should minimize both water and oxidizing agent exposure. A mass gain above 100% of the original sample mass suggests the inert

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2 / 2

atmosphere contains impurities.

## Attached files

Ti3C2Tx.001

sha256: 24ba18a835a1ef6cd7fb15033d327c2f372e4f95fcce5d6d9aa63e246c6eed1d

Ti3C2Tx.002

sha256: 0d151b79f948772bc395e017514af11697de8dd848665e5fdfaf3286ae5291b8

Ti3C2Tx003.txt

sha256: b03920e3e7d7cbbd9ff94ac593f3a7df9ed72279ba4d88de7dd75bd7ffc96b78

Ti3C2Tx.003

sha256: d582a4e14e4e7fe651b5735ac00caab8bacb72889d47d85e6929c44f1e015531

Ti3C2Tx001.txt

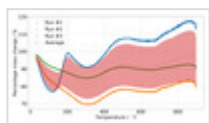
sha256: 628e791c95df52180a70380a55914d0357a2306b143c6aa1da3616bde3506efe

Ti3C2Tx002.txt

sha256: adadd6aa39f0e18bf75215dbd56037cc3b7d58f74d7c4b9c75350c4cdaa57bd4

TGA\_2020-02-27.png

sha256: 92531519c535e542fa2d0acdce3b30eb7afe6649a77a2e23a623e78a1febfcaf



Unique eLabID: 20221019-43dc7e57588fa887f85a60766b93e125c79fb7e9

Link: <https://frankel-elab.manchester.ac.uk/experiments.php?mode=view&id=49>