

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

Date: 2020-11-10

Tags: Oxidation TGA TAQ500 11/03/2020Synth

Created by: James Bird

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Goal : Perform TGA of powder Ti_3C_2 MXene to comprehend its thermal stability of terminating groups and core structure

Procedure :

- Submit 134.5 ± 0.6 mg of freeze-dried, alumina pestle and mortar ground- Ti_3C_2 MXene (16/09/2020) synthesised in [\[Experiment\] MXene synthesis V](#)
- Submission process saw two month wait between sample submission and running of samples, hence two months of sample storage in ambient conditions
- Samples loaded into platinum pans without lids
- Temperature ramp program of room temperature to 800 °C at 10 K/min ramp rate
- Samples masses were 16.7420, 17.259, 19.734, 16.963 and 14.408 mg for Runs #1-5 ran in air atmosphere, respectively
- Sample masses 14.031, 16.546 and 13.296 mg for Runs #1-3 ran in argon atmosphere, respectively
- Sample purge flow set at 90 mL/min of argon or air (atmosphere) and balance gas flow at 10 mL/min of Nitrogen on TA Instruments TGA Q500
- One sample was cycled (re-ran) after a ramp in air atmosphere under the same conditions

Results :

Sample stored in non-ideal (ambient) conditions for shorter amount of time than in previous TGA (see [\[Experiment\] Thermogravimetric Analysis \(TGA\) of freeze-dried MXene - TA Q500](#), 2 months vs 4 months), although would still anticipate oxidation. Larger average sample mass of 15.76 ± 2.25 mg is an improvement on previous analyses where average mass was 2.17 ± 1.34 mg - reduces measurement error and more complete pan area coverage. Sample labelled 'Decomp' is as described above.

.### files are raw outputs from TA Instruments Universal Analysis 2000 software

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package, .txt files are the same data exported in a human-readable and columnar format and the .png files are plots of the data where mass changes are plotted as percentages against temperature.

Conclusions:

Good reproducibility of data in air atmosphere. Jumps in data in argon atmosphere are assumed to be experimental issue.

Attached files

Ti_3C_2_T_xMXeneAir.004

sha256: 9aaab79b60afa28952206bde0a18b8b7bdbccb4c94572a3a58ca82fe1d4af35d

Ti_3C_2_T_xMXeneArgon.003

sha256: 28684a0138f37f1ada70720159eee082561921fcea0bbf0d1f2d16fe43f6f461

Ti_3C_2_T_xMXeneAir.005

sha256: 39f1e61110f4dfd751e35e9e27c4c2c52c78ab125ce33cbffd753410f57ec442

Ti_3C_2_T_xMXeneAir.001

sha256: 72c1eeaf230038e4148f217ec85990c6324936bf687eb45b172f478b9db8653c

Ti_3C_2_T_xMXeneArgon.001

sha256: 4df20386488dd5d5284bbb648788d60ddb501cddf10d7ef9793afdd03844ff4e

Ti_3C_2_T_xMXeneAir.002

sha256: eb01cb3bd26afc6fc293aa687284e50d25afdfbdb96c6f6cc8c3371d6d99efbc

Ti_3C_2_T_xMXeneAirdecomp.002

sha256: b0dedf20e21b6d8cf1a06dccc7221d214ba7e0ddbceb3640cbe24665e75eddf6

Ti_3C_2_T_xMXeneArgon.002

sha256: e021f721d9b34f3d706bc1dee87c60fa0f7de00074af64346db642f9c604e387

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Ti_3C_2_T_xMXeneAir.003

sha256: 8f8fe1d5ec0bfab936e2fbe713b212751038f3911e076f6540b3a05fdb31918

Ti_3C_2_T_xMXeneAir004.txt

sha256: 7f76fdd2387bd2a58d020bcf0686a3d1bb33a350f0ee846dbb32188fbf48a5ac

Ti_3C_2_T_xMXeneAir005.txt

sha256: 76559e9bb2dad31ee23a33081bc645e1c19ab7e45df56db809d8ae25f4765ff2

Ti_3C_2_T_xMXeneAirDecomp002.txt

sha256: 22cd79bba153e610c690b720daba8b949448a1017f98e9e0dfa9753155e3404c

Ti_3C_2_T_xMXeneArgon001.txt

sha256: fe32d6cea124a107c269583a37e0afed7b4fcf89949747f521dc59d1ed5ca8ca

Ti_3C_2_T_xMXeneArgon002.txt

sha256: 2ad8552197aa52fb5ef980f5ee9972b44670f946631e3ff8e5c7e44b9409ef34

Ti_3C_2_T_xMXeneArgon003.txt

sha256: 7053e718af37aa9b0ea141051efd9b247e1c52aa65674aac14ecfa307e751ace

Ti_3C_2_T_xMXeneAir001.txt

sha256: 37d1b57f1e6eb3753fb0f678052c259ba8d8146e81bce876374beaa2598e26b8

Ti_3C_2_T_xMXeneAir002.txt

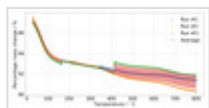
sha256: bdc222324f013773644213f126f664a052674e8cac20fe37c7cdd37b6f45b118

Ti_3C_2_T_xMXeneAir003.txt

sha256: 600ad71c51e20ba55bcd966306078efd12806251f5c178812cf5012f515d2794

TGA_2020-11-10_Argon.png

sha256: 36add7080988cef89ba16c30ad5f845f4f049b7ed5715331ca3a09d3f696293c



TGA_2020-11-10_AirDecomp.png

sha256: 39ffe4b6ed65ac6dc073d8659478385d5d404685f586145affa9777d6fcdffe2

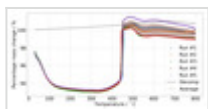
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Unique eLabID: 20221026-a4c725885d6cab5d7520a9854baf4903b661de62

Link: <https://frankel-elab.manchester.ac.uk/experiments.php?mode=view&id=59>