MSE-9: Ti_xC_y MXenes for Improved Supercapacitors

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Problem Statement:

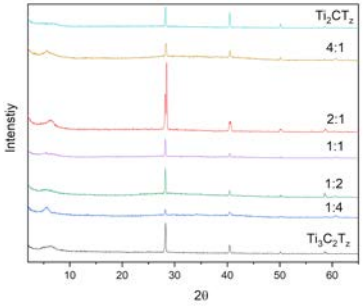
MXenes have already excelled in energy storage, by creating an active Ti_2C crumpled MXene binder to Ti_3C_2 crumpled MXene can be optimized to further enhance energy density to follow the trend in supercapacitor research.

Approach:

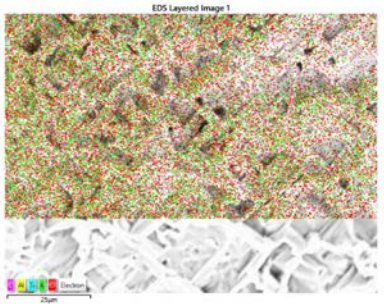
Created a mixture of crumpled MXene of different ratios to correlate to capacity measurements for an improved efficient supercapacitor:

- MXene synthesis.
- Concentration analysis.
- Ratio mixing of Ti_2C crumpled MXene to Ti_3C_2.
- Characterization, analysis/electrochemical testing.

Results:



XRD analysis of various MXene ratios.



SEM/EDS analysis showing KCl present in the mesoporous crumpled MXene.

- XRD showed formation of crumpled MXene in the non-basal planes.
- EDS/SEM indicated the presence of pores filled with KCl salt.

Discussion & Conclusions:

- Mixtures of MXenes did not compromise the integrity of MXene by formation of the 3D-crumpled MXene; interfaces were consistent with pure MXenes.
- Delamination peaks formed *via* XRD occur due to the lightweight nature of the individual flakes causing difficulty in the analysis.
- The presence of KCl salts hindered the electrochemical testing of the MXene ratios.
- Porous structure proved promising for electrolyte retention and energy density.

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