MXene surface chemistry and its applications for energy storage

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MXene chemistry and application are rapidly developing. Since first report of chemical exfoliation of MAX phases more than decade ago, many different compositions of MXene and surface functionalization was reported. Thanks to several unique properties like high conductivity, rich variability in chemical composition and surface chemistry as well as its stability, MXene are broadly applied in many fields especially energy storage. MXene are fabricated by selective etching of A element (typically Al or Si) from MAX structure. In this contribution the surface termination of MXene and possibility of their chemical functionalization will be explored. The oxygen group termination can be functionalized with siloxanes forming metal-oxygen-silicon bonds. Siloxane chemistry functionalization allowed effective introduction of various organic group on the surface of MXene for broad spectra of applications. [1] The scheme of MXene functionalization using siloxane is on Figure 1.
Also, direct reaction with chalcogen allowed changes in functional group as well as at higher temperature formation of composites systems by direct formation of transition metal dichalcogenides. Direct topochemical conversion of MXene produce composites materials as well as chalcogen terminated MXene surfaces. [2] Defect engineering is other way to enhance performance of MXene in energy storage applications. [3]

References

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Figures

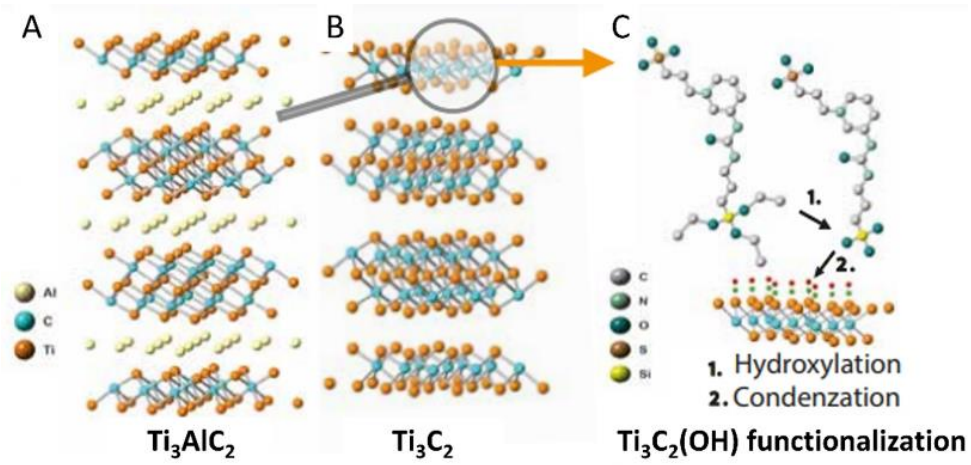

Figure 1: MXene functionalization using siloxane chemistry. [1]