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Static Electronic Analysis of the As-prepared and Aged Ti3C2Tx MXene Using X-ray Photoemission and Absorption Spectroscopy

MXenes, the two-dimensional class of nanomaterials consisting of transition metal carbides, nitrides, or carbonitrides, have been spotlighted in the last decade due to their exceptional properties allowing them to be applicable in different fields. In particular, the Ti3C2Tx MXene phase has been paid a great deal of attention from the whole scientific community due to its unique characteristics which make it possible for that phase to be intensively used in electronic and optoelectronic applications. Therefore, it is crucial for such applications to understand the stability of that phase, which gets oxidized very easily, after applying an X-ray beam. Testing the stability of the aged sample governs the possibility of engineering that phase of MXene in different durable applications to ensure their long-term performance. Accordingly, X-ray photoelectron spectroscopy (XPS), and near-edge X-ray absorption fine structure (NEXAFS) measurements with the synchrotron soft X-ray source have been implemented on Ti3C2Tx MXene thin film deposited on a quartz substrate for the same sample right following the preparation and a year later.

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