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ELECTROMAGNETIC SHIELDING RESULTS FOR MXENES USING DIFFERENT DELAMINATION METHODS.

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The growing need for reliable electronics and new telecommunications systems has emphasized the importance of electromagnetic interference (EMI) shielding. With the advent of 5G technology, there is a push to develop new EMI shielding materials that enable 5G to coexist with other technologies. A key factor in selecting these materials is shielding effectiveness (SE), which measures how much an electromagnetic wave is reduced when passing through the shielding material.

MXenes a new class of transition metal carbides/nitrides exhibit outstanding electronic conductivity and remarkable performance as EMI shielding materials [1].

Despite these advantages, challenges remain in optimizing the synthesis methods of MXenes and enhancing their oxidation resistance. In this study, two different MXene materials were synthesized using a modified clay method [2]. Subsequently, a portion of the synthesized material, underwent hand-shaking delamination for 5 min (MX-HS), while another portion underwent sonication for 10 min (MX-US) [3].

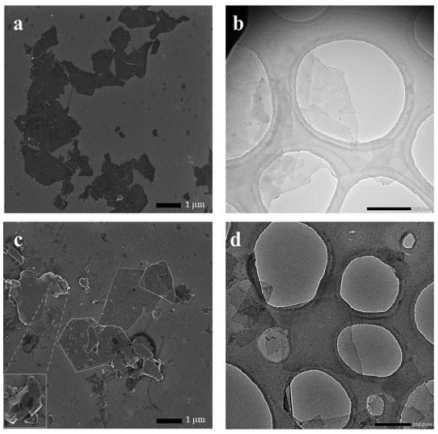

Figure 1 – Characterization of MXene

No notable difference in the flake size was observed resulting from the synthesis method. However, the hand-shacked delaminated sample retained some stackings of unexfoliated particles which were not observed in the sonicated material. This results in higher conductivity with the latter method, thus offering greater levels of shielding effectiveness. This is demonstrated through SEM images and measurements conducted using a variation of the ASTM 4935-18 standard method, within a frequency range of 1.5 to 10 GHz.

Shielding effectiveness values obtained from the two delamination methods are 41.35 ± 0.75 dB for (MX-HS) and 56.09 ± 1.60 dB for (MX-US).

References

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