



*ADVANCED ENERGY STORAGE SYSTEMS AND FUNCTIONAL  
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## *ABSTRACT BOOK*

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**New class of materials based on transition metal carbides as electrodes for batteries**

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**Abstract**

In this work we are presenting the “MXenes”, the new layered two dimensional materials family which includes more than 60 members. Particularly, we are reporting the technology of producing  $Ti_3C_2T_x$ ,  $T_x$ -stands for surface terminated groups (-OH, -F, -Cl, -O), which is the most studied member of the family. To produce MXene firstly we prepared the MAX phased ternary compound, where M-transition metal, A-group A element and X-carbide or nitride of that metal. To etch the “A” element form the MAX phase, the powder was immersed to HF or LiF/HCl and stirred. After the etching process, the samples were washed several times in distilled water until the pH of the solution is 6. The final product is the layered two-dimensional metal carbide with bigger surface area. In purpose to get single flakes of the material, we delaminated it in an ultrasonic bath. After filtration the solution in polyvinylidene fluoride membrane by vacuum filtration process, we get the layered structured film of  $Ti_3C_2T_x$ (MXene). The results were investigated by Raman spectroscopy, EDS, SEM, XRD.