

## Sphere Titanium Carbide MXenes as Efficient Electrocatalysts in Li-air battery

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MXenes possess attractive hydrophilicity, high conductivity, and durability for application in electrocatalysis. Herein, we assess promising  $Ti_3C_2$  as active candidates in lithium air battery system to reduce overpotential. Following the dealumination treatment of corresponding MAX phase materials in the presence of HF, the resulting MXene materials revealed interplanar mesoporosity. The obtained 2D materials were then generated with TMAOH and carefully characterized through SEM, TEM, ICP, XPS, and XRD analyses. In order to avoid stacking problem that 2D materials have, we designed 3D sphere MXene through simple hydrothermal process. By optimizing the hydrothermal time, we find that the MXene with 12 hours possesses the largest surface area with the best performance. Moreover, specific electrochemical properties have drawn due to different termination groups on the surface of  $Ti_3C_2$  from hydrothermal process. This research results indicate that the 3D sphere MXene will be a bright candidate for next generation of cathode materials in lithium battery.