Yongpeng Xia
Li Zhao, Xia Yang, Huanzhi Zhang, Fen Xu, Lixian Sun*
(Guangxi Key Laboratory of Information Materials, School of Material Science and Engineering, Guilin University of Electronic Technology, Guilin, 541004, P. R. China

sunlx@guet.edu.cn

Significant improved dehydrogenation of LiAlH4 doped with two-dimensional Ti_3C_2

Lithium alanate ($LiAlH_4$) has attracted intense interest as one of the most promising candidates for hydrogen storage due to its high hydrogen storage capacity (10.5 wt%) and low cost. However, the drawbacks of its dehydrogenation process are the relatively high temperatures and the slow dehydrogenation kinetics. In this study, a two-dimensional Ti_3C_2 MXene was doped into $LiAlH_4$ to improve its hydrogen storage properties. The composition evolution and dehydrogenation performance of the as-prepared sample were characterized by means of XRD (X-ray diffraction), FT-IR (Fourier transform infrared spectroscopy) and Sieverts-type pressure-composition-temperature apparatus (PCT) measurements, respectively. $LiAlH_4$-5 wt% Ti3C2 samples start to release hydrogen at 48.8 °C, which is 154.2 °C lower than that of as-received $LiAlH_4$. Isothermal desorption measurements show that the 5 wt% Ti_3C_2-doped sample releases 5.3 wt% of hydrogen within 15 min at 200 °C.

This work was financially supported by the National Natural Science Foundation of China (Grant No. 51361005, U1501242, 51371060, 51671062, 51102230 and 51462006), the Guangxi Natural Science Foundation (No. 2014GXNSFAA118319, 2014GXNAFDA118005, 2014GXNSFAA118401 and 2013GXNSFBA019244), Guangxi Key Laboratory of Information Materials (161002-Z, 161002-K), Guangxi Scientific Technology Team (2012GXNSFGA06002).

Figures

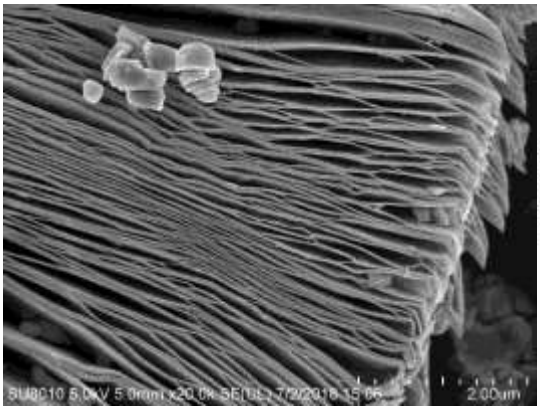

Figure 1: Fig.1 SEM images of Ti3C2

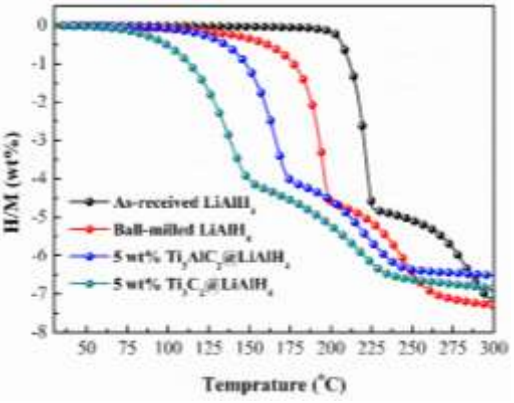

Fig.2 Volumetric release curves of the prepared samples.