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Catalytic effect of ScCl₃ on the dehydrogenation properties of LiAlH₄Zhijie Cao^a, Xiaobo Ma^a, Hailong Wang^a, Liuzhang Ouyang^{b*}^aAdvanced Energy Storage Materials and Devices Laboratory, School of Physics and Electronic-Electrical Engineering, Ningxia University, Yinchuan, 750021, PR China^bSchool of Materials Science and Engineering, Key Laboratory of Advanced Energy Storage Materials of Guangdong Province, South China University of Technology, Guangzhou, 510641, PR China**Abstract**

The dehydrogenation properties and catalytic mechanism of ScCl₃-doped LiAlH₄ have been studied in detail. After milling for 10 min, hydrogen evolution from 5 mol% ScCl₃-doped LiAlH₄ starts at ~90 °C, superior than that of raw LiAlH₄ (~144 °C) and as-milled LiAlH₄ (~124 °C). Moreover, this composite can release a hydrogen capacity of 3.6 wt% within 180 min at 150 °C, much higher than that of as-received LiAlH₄ (1.8 wt% H₂) and as-milled LiAlH₄ (2.8 wt% H₂) under the same condition. Results show that the catalytic effect of ScCl₃ comes from the reaction product ScH₂ between LiAlH₄ and ScCl₃, which can act as the catalyst for facilitating the dehydrogenation of LiAlH₄.

Keywords: Hydrogen storage; Complex hydrides; LiAlH₄; Kinetics

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