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Ti-Si photocatalyst for producing hydrogen synthesized by shock wave[1] JIANJUN LIU, HONGLING ZHANG, State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing 100029, China, PENGWAN CHEN, XIANG GAO, State Key Laboratory of Explosion Science and Technology, Beijing Institute of Technology, Beijing, 100081, China — Ti-Si binary system shows several intermetallic compounds such as $TiSi_2$ and Ti_5Si_3. Among them $TiSi_2$ and Ti_5Si_3 show the higher reaction heat and can be initiated by shock wave and will propagate and complete in the form of combustion waves. As new functional materials, the light-absorption characteristics in UV-visible region of Ti-Si compound are ideal for solar applications and have a good photocatalytic activity of splitting water into hydrogen. We have synthesized $TiSi_2$ and Ti_5Si_3 compound with different Ti/Si ratios by shock-induced reaction arisen from the flyer impact driven by detonation of nitromethane. It is found that $TiSi_2$ is formed while flyer velocity is at 3.37km/s and exhibits certain photocatalytic activity of splitting water into hydrogen compared with the unreacted Ti+Si precursor shocked at 3.07km/s. Consequently, Ti_5Si_3 synthesized at 3.37km/s has much better photocatalytic activity of splitting water into hydrogen than that of $TiSi_2$ synthesized by shock wave at identical condition. The experimental results suggest that shock-induced reaction of Ti and Si with different ratios might get some novel functional materials for photocatalytic or photovoltaic application.

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