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Shock-wave induced synthesis of few layer graphene nanosheets¹ PENGWAN CHEN, HAO YIN, CHUNXIAO XU, XIN GAO, QIANG ZHOU, State Key Laboratory of Explosion Science and Technology, Beijing Institute of Technology, LIANGTI QU, Key Laboratory of Cluster Science, Ministry of Education of China, School of Chemistry, Beijing Institute of Technology — Shock wave action combining shock-induced chemical reaction will cause a series of changes of material physical and chemical properties, which is supposed to be a new method for material synthesis and modification. Using solid CO2 (dry ice) as the carbon source, few layer graphene nanosheets were successful synthesized by reduction of CO2 with calcium hydride under detonation-driven flyer impact loading in this study. Furthermore, by adding ammonium nitrate to the reaction system, nitrogen-doped graphene materials were formed in this one-step shock-wave treatment. Similarly, few layer graphene and nitrogen-doped graphene materials were also prepared through the reaction of calcium carbonate and magnesium induced by shock wave. The shock synthesis of graphene nanosheets requires a balance between the growth rate of graphene materials and the formation rate of carbon atoms. Meanwhile, the pressure and temperature are two important factors affecting the synthesis of few layer graphene nanosheets.

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