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Abnormal Spall Behavior Observed in Pure Iron and FeMnNi Alloy Undergoing $\alpha - \varepsilon$ Phase Transition[1] ZHIPING TANG, XINHUA ZHANG, WEIWEI XU, University of Science and Technology of China, XIAOJUN TANG, HAIBO HU, Chinese Academy of Physical Engineering — The spall behaviors of pure iron DT2 and FeMnNi alloy were investigated experimentally by using a light gas gun and a double-sensitivity VISAR. The impacts for DT2 were symmetric and with same thickness of 6.28mm for both flyer and target plates. It was found that for the peak pressure lower than the $\alpha - \varepsilon$ transition threshold (13GPa), there was no spall occured. When the pressure was higher than the transition threshold, the spall happened based on the VISAR record. The recovered sample showed the multiple spalls at about 2 mm from the impact surface and the free surface, respectively. In the experiments for FeMnNi alloy, the flyer plate was A3 steel of 4.8mm thick and the target plate was FeMnNi alloy of 8-10mm thick. When impact pressure was higher than the $\alpha - \varepsilon$ transition pressure of A3 (13GPa), a shallow spall happened in the target plate at the distance of 1.26mm from the free surface. Such abnormal spall phenomena (the multi-spall occurred in homo-thickness target impact in DT2 and the shallow spall in FeMnNi alloy) are believed to relate to the $\alpha - \varepsilon$ phase transition of iron.

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