AKEBULAKE IRON METEORITE: THE SECOND CONFIRMED IMPACT SITE IN CHINA. B. Miao (miaobk@glut.edu.cn), G. Chen, C. Zhang, Z. Xia, Z. Ban, J. Tong and L. Huang, 1Institution of Meteorites and Planetary Materials Research, 2Key Laboratory of Planetary Geological Evolution, 3Guangxi Key Laboratory of Hidden Metallic Ore Deposits Exploration, Guilin University of Technology, Guilin 541004, China.

Introduction: Impact events are an important process of Solar System formation and evolution, e.g. a large number of impact craters on the Moon and Mercury[1]. Since the complex history of movements of the earth crust, a lot of ancient meteorite craters on the earth have been erased. However, nearly 200 meteorite craters and/or impact sites are confirmed as yet. These meteorite impacts with their impact products have great significance of getting insight into impact history of the earth, extraterrestrial material flux, as well as modification of rocks and minerals under supervelocity impacts. Since 1980’s, Chinese cosmochemists and geologists have made great efforts to look for meteorite impacts in China [2], only one meteorite crater is confirmed until 2012 with impactite evidences [3]. Recently we found some impactites around Akebulake iron meteorite in Xinjiang, China. Based on petrographic observation and research, the impactite samples display rich shock metamorphic effects and confirm an impact site. Here we present a preliminary report on this second impact site in China.

Aletai iron meteorite rain: In 1898 a large iron meteorite with 28 tons was found in western China, Xinjiang, which was named Armanty and is the biggest meteorite in China and also one of the biggest meteorites in the world. In recent 10 years, more than 10 big iron meteorites have been found in Aletai region, northwest Xinjiang. These iron meteorites share the same type as IIIIE. Furthermore, their found positions are located geographically within an array, suggesting that they belong to a iron meteorite rain. Interestingly, its strewn field spans over 425 km (Fig.1) , which should be the longest one on the earth [4].

Geological Setting: Akebulake, weighing 18 tons, was found in 2011. It locates on a top of Aletai Mountain range, where is covered with snow for most of the year. The altitude is above 3000 meters. In the vicinity of its site, it was covered with so many huge granite boulders that it could hardly find the outcrop of bedrock. Based on the geological map of the region and the field survey, Akebulake should land on granite body.

Petrography and Shock Effects of the Impactites:
 Petrography. In this work, two kinds samples with different shock-induced melting degrees are observed. Both of them occur in the vicinity of Akebulake recovery site. One is a kind of vesicular molten glass, while the other is partially impact-melted granite. The glass consists of black glass matrix and white/light brown quartz grains as porphyry, and the glass matrix is vesicular with mm-sized bubbles, it has two colors of bands which shows a flow texture. And the partially melted granite displays blastogranitic texture. It shows varying degree of melting, from one end of almost molten glass with quartz relic grains, to other end of fractured granite without obvious melting of minerals.

Shock effects. The two kinds of petrographic type samples show similar shock features, but with somewhat different melting degrees. The main shock effects are included as follows: (1) The impactite rocks experienced strongly shock-induced melting into glass which shows a flow texture and vesicular texture. (2) the shock effects of quartz include mosaic fracture and extinction, melting along cracks in it, brown melt in some quartz grains with some small vesicles and crystobalite crystallization. (3) Plagioclase and orthoclase are transformed into diaplectic glass or melt glass in which some crystallites are formed. (4) Mica displays different shock effects. Some mica grains are shocked into magnetite aggregates embedded in glass. And other mica grains are decomposed into small magnetite crystallites. (5) Zircon is decomposed into baddeleyite and quartz along its boundary, and some zircon grains are melted in its rims.

Discussion and Conclusions: It is confirmed that the samples are direct shock products of Akebulake iron meteorite. The composition of glass shows that the original rock of the glass impactite is granite – monzonic granite. The peak shock pressure should possibly be 30- 50 Gpa[5]. The post shock peak temperature is probably over 1750 °C[6]. Above all, the recovery site of Akebulake iron should be a second impact site in China. However, the structure of this impact site needs further work.

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Fig. 1 The strew field of Aletai iron meteorite rain (modified after [4])