

Magnetite Ore Deposit of the Naka-Osaka Mine (Shimonita, Gunma Pref.) is probably IOA (Kiruna) type

*Atsushi MIYASHITA¹, Hiroyasu MURAKAMI², Wataru FUJITA¹, Masakazu RIKITA³, Takashi ICHIKAWA⁴, Tomohiko SEKIYA⁵

1. Seikei University, 2. Waseda University, 3. Shimonita Nature School, 4. Keyaki Special Support School, 5. Shimonita Geopark

The Naka-Osaka Mine in Shimonita, Gunma Prefecture, Japan, is the geosite of the Shimonita Geopark. This mine is also an industrial heritage site where iron manufacturing was carried out in the early Meiji era in Japan. It was produced high-grade magnetite ore. The Naka-Osaka Mine is located on the north side of the Ookitano-Iwayama tectonic line (the Median Tectonic Line of Japan). The iron ore deposit is composed of small but high-grade magnetite ore bodies, and are embedded in both the Nanjai Formation and the Namee Granite. The Nanjai Formation is correlative with the Jurassic Tanba-Mino accretionary complex. The 70Ma Namee Granite is correlative with the Cretaceous Ryoke I-type granite. The magnetite ore bodies are lenticular and/or vein shaped with wide alteration zones which are composed actinolite or hydro-biotite + chlorite with carbonate stock-work veinlets. Magnetite contains Si up to 3 wt.% and often contains euhedral Cl-apatite micro inclusions(Fig. 1). The small amount of sulfides (mainly pyrrhotite) is associated with the magnetite ore suggesting a low sulfidation state. The composite grain of loellingite and arsenopyrite often found with magnetite, and arsenopyrite contains high arsenic around 36 mol.%. The filling temperatures of primary fluid inclusions in fine fluorite veins are above 500°C, which is a higher-temperature as compared with common hydrothermal deposits. Actinolite, hydro-biotite, and chlorite associated with magnetite contains up to 1 wt.% chlorine. These altered zones are not accompanied by acidic altered index minerals, such as alunite or kaolinite. Magnetite with apatite in a neutral to alkaline alteration zone at high temperatures above 500°C in close to the large-scale tectonic line. These features of the Naka-Osaka mine strongly suggests that the magnetite ore deposit belongs to the iron oxide-apatite (IOA or Kiruna) type. The formation age of the ore deposit is younger than 70 Ma, which is one of the youngest IOA types in the world.

Keywords: Naka-Osaka Mine, Magnetite, Iron-Oxide Apatite Type, Kiruna Type, IOA Type, Shimonita Geopark

