

Granitic asteroid collided with the parent body of Muonionalusta iron meteorite

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Mineralogical investigation has been carried out on a magmatic iron meteorite. Although many magmatic iron meteorites have been investigated so far, it's noted that only four IVA irons contain silicate inclusions among magmatic iron meteorites. Two IVA irons contain a few number of tridymite crystals, and two others contain up to 50 percent silicates in volume; they are mostly pyroxene and tridymite mixed with metal; some of both phases reach to centimeter size. I carried out mineralogical study of Muonionalusta iron meteorite (IVA) and report the research result. Previous investigation has found stishovite that was presumably tridymite before impact. In contrast, I found many other different kinds of silicate and oxide minerals in the iron meteorite. I found alkali feldspars, plagioclase, olivine, pyroxene, garnet, biotite, hornblende, sphene for the first time in an iron meteorite, Muonionalusta (group IVA). I identified those minerals using Raman micro spectroscopy, and their compositions were analyzed by energy-dispersive micro probe spectroscopy. Such mineral assemblages imply that these silicates might have crystallized from felsic magma generated by partial melting of the parent body. Such asteroid can have an evolved granitic crust.