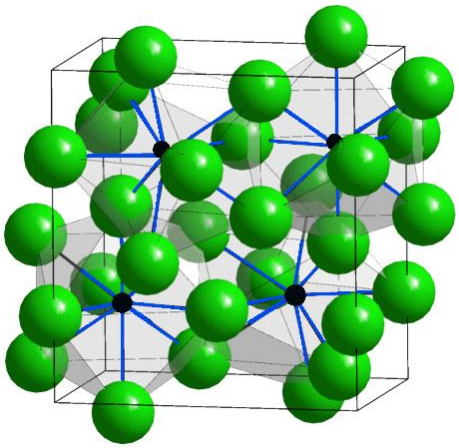
Iron Carbide Fe_3C; also known as Cementite

Iron carbide , Fe_3C in chemical short-hand, is also known as "**cementite**". It is a chemical compound of iron and carbon. Iron carbide is normally classified as a "*ceramic*", i.e. it is hard, brittle and an insulator.

- Considering that carbon steel is what it is because of cementite, I was amazed how little information I found about the stuff. Its lattice type and so is known, of course (see below) but not much else.

Illustration

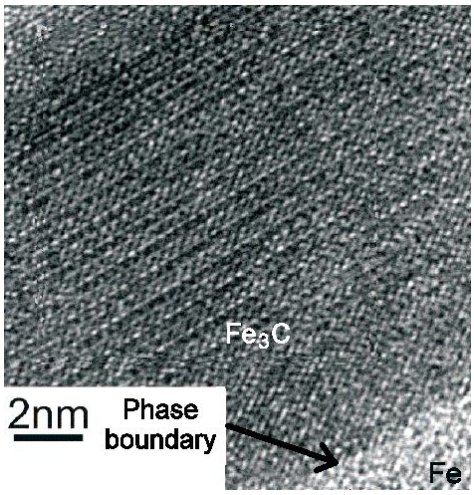


Crystal cell of iron carbide Fe_3C

The green spheres symbolize iron atoms, the small black spheres at the intersection of the thick blue lines (symbolizing bonding) symbolize the carbon atoms. The cuboid symbolizes the elementary unit cell of the crystal.

Source: after Wikipedia

- Here is a HRTEM picture of a cementite particle in steel.



HRTEM picture of a cementite precipitate in an iron matrix

Source: Picture from Eyüp Duman's PhD thesis: "Druckabhängigkeit der Invar-typischen Instabilitäten von Fe_3C-(Zementit) Partikeln", Universität Duisburg-Essen: 2006; thanks for letting me use it.

- Cementite is not found as a mineral in nature, except in iron meteorites. Then it is called *cohenite* after the German mineralogist Emil Cohen who first described it.
  - Cementite is rather hard (HV = 800) and brittle. It is magnetic like iron but looses its magnetism at a Curie temperature of 215 ^{o}C (424 ^{o}F).
  - It appears that cementite has no major uses by itself.