Graphite Handout

Graphite is a convenient material to use for samples for the STM because it gives good atomic resolution images even in the air. Low quality graphite is used as the "lead" in pencils. However, high quality graphite is composed of natural carbon that is formed into graphene sheets that, when combined, form graphite. A thin sample of graphite is placed under the STM scanner to view its atomic image.

The graphite crystal lattice has the following measurements:

a=2.4612 angstroms
c=6.7079 angstroms

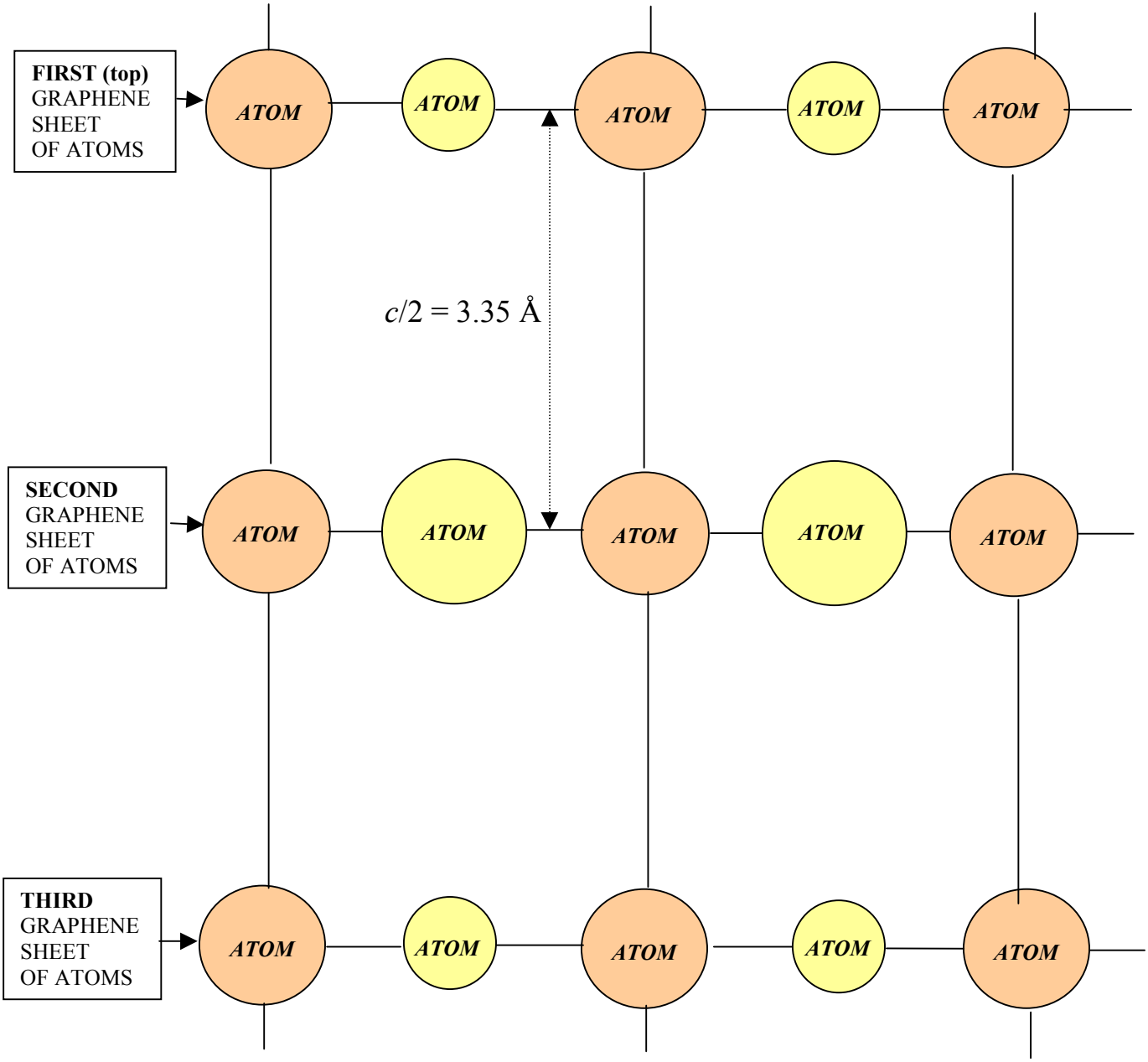
Where: a = lattice constant in the plane, and c = lattice constant perpendicular to the plane.

Carbon is one of the most fascinating of all materials. It is the basis of all life and of all organic chemistry. One of its forms, diamond, is the hardest of all known materials and has the highest thermal conductivity. The discovery of C60 in 1985 and the subsequent discovery of other forms of buckeyballs and of carbon nanotubes have opened the door to a vast new range of carbon-based materials with some extremely useful properties.

CARBON ATOMS IN A GRAPHITE SAMPLE

A sample of graphite consists of graphene sheets which are layered on top of each other. Each graphene sheet is a layer of carbon atoms. There are 6 protons and 6 electrons within each carbon atom. Half of the atoms in a graphene sheet connect weakly to the layer above it and the layer below it. The surface layer only has bonds to the layer on one side.

SIDE VIEW DIAGRAM OF 3 GRAPHENE SHEETS WITHIN A GRAPHITE SAMPLE



http://cst-www.nrl.navy.mil/lattice/struk.picts/a9.s.jpg

TOP VIEW DIAGRAM OF 2 GRAPHENE SHEETS WITHIN A GRAPHITE SAMPLE