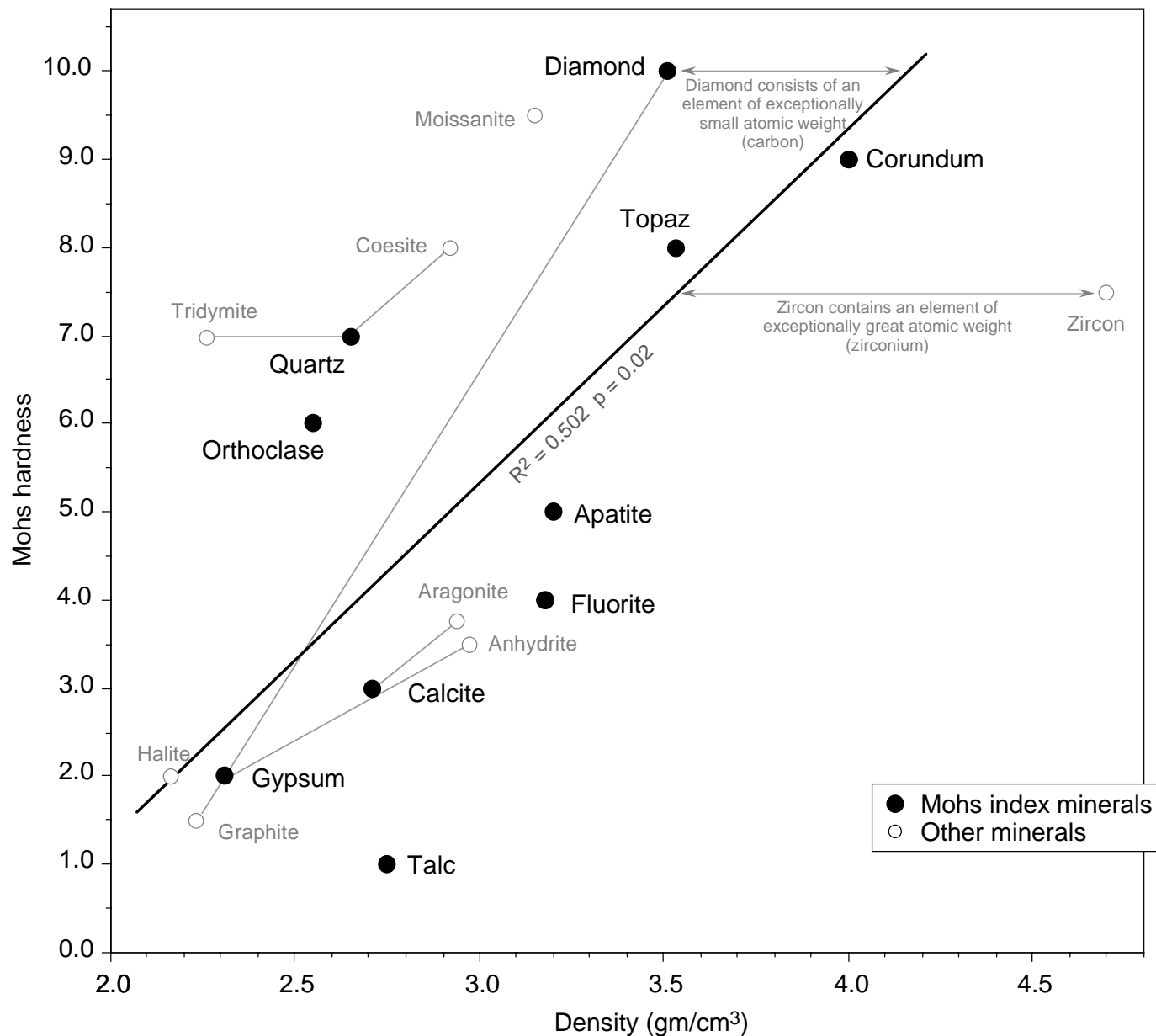


Density *and* hardness I: a first look

The index minerals of the Mohs system of hardness present an interesting



pattern: hardness is roughly correlative with density. In addition, several pairs of polymorphs show the same trend: the more dense mineral is the harder mineral. This relationship makes some sense, in that closer packing of atoms would give greater density *and* would allow shorter bond lengths, which allows greater hardness.

With that said, the relationship shown on this plot is hardly an exact one, with a relatively low correlation coefficient. One reason is that density of a mineral, as we've seen, depends on many factors. One factor is the atomic weight of the mineral's atoms. Two minerals on the plot exemplify this: diamond consists of the light element carbon and thus inevitably falls to the left (the low-density side) of the correlation line. Zircon, on the other hand, contains the heavy element zirconium and thus falls to the right (the high-density side) of the correlation line. It's thus no wonder that the correlation is a sloppy one. A better approach would be to normalize a mineral's density for its formula weight, as we'll see in Part II of this series.