Madagascar Garnets

By Alain Darbellay GGGems

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Crystalline System: cubic.

Red − violetish: Hardness Density Ref.Index
Pyrope Mg3Al2Si3O12 7,25 3,58 g / cm3 1,714
Almandine Fe3Al2Si3O12 7,50 4,32 1,830
Rhodolite Mg,Fe3Al2SiO12 7,25 3,78 − 3,90 1,74−1,78

Orange − yellow−brown :
Spessartite Mn3Al2Si3O12 7,25 4,20 − 4,25 1,78 − 1,81
Malaya Mn3Al2(SiO4)3 7,25 3,74 − 4,00 1,78
Hessonite Ca3Al2(SiO4)3 7,25 3,58 − 3,65 1,73 − 1,74

Green :
Tsavolite Ca3Al2(SiO4)3 7,25 3,60 − 3,68 1,73 − 1,74
Uvarovite Ca3Cr2Si3O12 7,50 3,85 1,87
Dementoïde Ca3F2SiO12 6,5 − 7 3,82 − 3,85 1,89

In a perfect crystal, when a face appears in the crystal in the process of growth, all the faces appear with the same development.
If one of the symmetrical faces is less developed on a crystalline sample, or exceptionally does not appear, that comes from the accidental actions of the external environment which opposed its growth.
Temperature, pressure, nature of the mineral solution, speed of the crystalline growth and the direction of the movement of solution etc... represent the external influences on the crystalline forms.
The frequency of the faces of the crystals is related to the reticular density, the fast growth of some

faces
influences the crystalline form definitively.
Garnet thus crystallizes under the cubic system, whose crystals are characterized by the presence of three
quaternary axes A4 joining the centers of the faces, four ternary axes A3 joining the opposed tops, six binary
axes A2 joining the mediums of the edges.

· One of the causes modifying the initial form of crystals is truncation.

Truncation on corners.

Cube Dodecahedron

Truncation cuts two different lengths on adjacent corners.

Cube Tetrahexahedron

Truncation cutting three equal lengths out of the three adjacent corners.

Cube Octahedron

Truncation cuts two equal lengths out of two corners and a larger length on the third.

Trisoctahedron Octahedron
Truncation on the segment crosses, two equal lengths out of two corners, a smaller length on the third.

Cube Trapesohedron

Octahedron Trapesohedron

Dodecahedron Trapesohedron

Hexoctahedron Dodecahedron

Almandine in matrix Pyrope−Almandine Almandine in matrix

Almandine in matrix Almandine in matrix Rhodolite (Ambohitompoina)

There is also a law according to which certain crystals do not present modifications that on half of corners, or of the
similar angles.
Here is a truncation on a top cutting three different lengths on corners, and which repeats only three

times around
the ternary axis.

Cube and diplohedron Diplohedron Right Gyrohedron Left Gyrohedron

The diplohedron is made of twenty−four irregular quadrilaterals. The class plagiohedron whose faces (HKL) are
arranged in the spiral order.

In other cases, twelve irregular pentagons are formed by a truncation on one sharp angle, on both adjacent angles, the
unequal lengths, it is the pentagonal dodecahedron.

Positive Negative

Almandine in matrix Tsavolite (Madagascar) Spessartite in pegmatite
(Tsilaizina)

The regular tetrahedron consisted four equilateral triangles forming between them an angle of 70° 31.

Positiv tetrahedron Négativ tetrahedron Octahedron

Positiv tetrahedron Cube

The tetrahedron or triakistetrahedron consisted twelve faces which are isosceles triangles, and the hexatetrahedron
with its twenty four triangular faces.

Triakistetrahedron Hexakistetrahedron

The trapezoidal dodecahedron consisted twelve quadrilaterals deltoid and the tetrahedral pentagonal dodecahedron
are formed by a truncation appearing on each top and cutting three different lengths on angle.

right left
Deltoid dodecahedron Pentagonal tetraedrical dodecahedron . Almandine in matrix

Spessartite (Ambohimarangitra) Malaya (Andoharano) Malaya (Madagascar)

Rhodolite (Ankilytokana) Hessonite (Soakibany) Imperial Malaya (Madagascar)

In Madagascar, one finds rhodolite in a gneiss rich in biotite, in which (almandite−pyrope) is presented in the form of
small grains, or with the state of large porphyroblasts, generally deprived of geometrical contours,

plagioclase
(oligoclase with andesine) is the feldspar dominating and sometimes exclusive. These gneisses contain sometimes
pegmatic beds very rich in crystals.
One very finds also garnetiferous gneisses containing little biotite, hardly directed.
Kinzigites. The gneisses which have been just enumerated have a very clear schisteous structure, which had with the
biotite abundance. A rather frequent type is approximately blocks and presents a compact aspect, thanks to the
prevalence of large garnets without geometrical form, associated quartz and feldspar granoblastic, biotite is not
very abundant. The structure points out that of corneal micaceous of contact of the granite. This gneiss can be
compared with the kinzigite of the Black Forest.

Leptynites with amphibolo−pyroxenite intercalation rich in garnets of a pale pink (almandite−pyrope), with often
rutile and graphite abound in certain areas of Madagascar. The feldspar is orthoclase, associated with
ogigoclase−albite feldspar and sometimes with spindle−shaped microperthite, there exists much of

myrmekite.
These rocks are with fine grins, but they very often contain large regularly distributed crystals.
Usually garnet does not have a geometrical form, but it takes clear faces in more quartzose zones.
Leptynites derive from the granites by disappearance of the mica; the garnetiferous mica schists constitute the
opposed pole in which biotite prevails, with progressive disappearance of feldspar.

The Besafotra river carry out the
spessartites on several kilometers from their
source, doubtless a sodolitic pegmatite.
A walk of 25 kilometers among the mountains
is necessary to reach this place.

SPESSARTITE GARNET

The tanety "grounds bordering the river," are also
the object of the orange garnet's fever.

Sifting in river.
Initially, the spessartite appeared in the
Besafotra river, searched out here near to
its source.

Ankilytokana, one of the fabulous rhodolite occurrences
exploited in a leptynite vein on a sixteen meters depth.

RHODOLITE GARNET
Leptynites are primarily consisted in alkaline feldspars and quartz. When these rocks are not ribboned, and that is frequent, it is often difficult to decide if a sample, not seen in place, belongs to a leptynite or an aplite, it should be noticed that in Madagascar, these last contain microcline and not of orthoclase. In this area, one observes graphite spangles in the leptynites.

Malaya garnet discovered into September 1998, in eluvium in a broken up leptynite.
The modest depth of the deposit did not require a significant work to extract it.

This stone shows an exceptional capacity to restore the light, thanks in particular to its high refractive index, especially under not very enlightened condition.

Malaya Garnet Discovery

Cutting Styles¦Characteristics¦ Crystalline Systems ¦ Madagascar Sapphire ¦ Corundum data

¦ Malaya Garnet ¦ Rhodolite Garnet ¦ Spessartite Garnet ¦ Hessonite Garnet ¦

Your guide to GGGems
All the pictures on this site have been shot by gggems.com Alain Darbellay

http://www.gggems.com/madagascan_garnets.htm

Discovery of Pyrope Spessartite garnets (Madagascar)

By Alain Darbellay GGGems

Discovery of Pyrope Spessartite garnets (Madagascar) by Alain Darbellay GGGems

A day of July 1996 whereas I stopped in a small village in Madagascar, one presented samples of a strange stone to me. At first sight its color could reminds certain zircon, but I quickly identified them as garnet. After some palaver, one led me to the place of the discovery. I must acknowledge that I already knew the inhabitants with whom I tied friendship the previous year. On the spot, a notch of about one meter fifty in a white color rock had created a not very impressive hole. But, according to its authors, it was particularly painful to produce it with iron bars only . I readily believed them after to be approached to the rock. Some particles of this stone to the orange − pink−brown reflections remained taken in the bedrock. I encouraged my friends to be still sought.

The first samples extracted from a not disaggregated leptynite did not exceed 3.15 cts. after cutting.
The observation under day light and incandescent light showed a clear difference in color.
Its change, from the champagne color under daylight, to an intense red for some, or to pink−orange for others is due to chromium and vanadium traces.
This characteristic confers an attractive aspect on these gems.

Other samples were orange−yellow and did not change a color under the various sources of lighting.

Unfortunately, the very hard and compact rock in this place, did not allow to extract many stones from it, and the occurrence was abandoned a few weeks after its discovery.

Opposite, first samples cut in 1996 showing a change of color.

Above, an orange malaya found also in the primary occurrence. (It does not change a color)

This is two years later, exactly in September 1998, that returning in the small village, the samples more or less similar to those which I make cut in 1996 were found. They were turbid because of the fine rain of small bubbles they contained. Their color was definitely more orange than malaya garnets from the first occurrence. Indeed, they did not come from the same place. This is a little more than one kilometer of distance that the elluvionnar deposit was discovered. I was immediately conscious to be the witness of a rare moment in the career of an impassioned person in precious stones.
At this time started the orange garnet's fever.
The stone did not show almost any more change, its champagne−orange color at the day was simply reinforced in a vivid orange or for other elements in an orange−red under electric light.
This type of garnet is a pyrope−spessartite also containing vanadium and chromium traces.
On the totality of Malaya extracted, a small part was pure, but much showed typical inclusions of this stone.

Initially networks of rutile needles and strain patterns were often present, and inclusions of graphite accompanied them.
Negative crystals and, quartz, apatite, monazite and zircon had been also invited during the growth of the precious malaya garnet.

Here the first pyrope−spessartite cut in 1998.

Realized in an arid landscape composed of bushes and cactus, this discovery remains exceptional by the quality of its product and also by the fact that it was the second deposit in the world to deliver this type of Malaya garnet.

Here, one of the only intact garnets
found in the occurrence.
Its unusual stacking shape must be noticed.

Refractive Index: 1.73 − 1.81
Chemical Composition: [Mg3 + Mn3]AL2(SIO4)
Hardness: 7 − 7.5
Density:
3.65 − 4.20
Crystal Group: Cubic

Above, the only phlogopite mica found in the neighborhood of the deposit at that time, it is still in its gangue.
Of transparent quality, it shows a similar color to that of malaya garnets.

¦ Garnet data ¦ Madagascar Gem Safari ¦ Malaya garnet Catalog ¦

http://www.gggems.com/pyrope_spessartite_garnet.htm


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