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Coated Tanzanite – now in India

The organizing committee of the Jaipur Jewellery Show (2008) selected Tanzanite as the theme of the show and the same will be promoted during the upcoming year too. The basic idea behind this is to make this popular gem more popular and trendy amongst the consumers. But along with enjoying the charm of this incredible gem, one has to be cautious as well, since 'Coated' Tanzanite has hit the Indian market.

It was May 2008 when coating on tanzanite was first reported by the American Gem Trade Association Gem Testing Center (AGTA-GTC) and American Gemological Laboratories (AGL). After this report, Shane F. McClure and Andy H. Shen of the Gemological Institute of America (GIA) also released an article on coated tanzanite in the Gems & Gemology, Summer 2008. Until October 2008 we did not receive any such material for identification at the Gem Testing Laboratory, Jaipur but now these coated tanzanites are more frequently encountered at GTL (figure 1) which indicates the arrival of a concern in the Indian tanzanite trade.

Figure 1

The face up colour of these coated tanzanites ranges from violetish blue to blue of varying saturation from medium to high. However, in general most of these are of intense blue. Coating on tanzanite is applied on any size but is mainly employed on smaller sizes. Smaller sized stones are generally paler and do not display their maximum colour, therefore, in order to enhance colour of these smaller sized stones coating has been developed. But, this doesn't mean that larger sized coated tanzanites are not available! The size of these coated tanzanites submitted for identification at GTL varied from 1.30 to 0.25 carats.

This new coating is not very obvious but careful examination using proper techniques will reveal the true identity. Coating does not affect the gemmological properties but using magnification features along with immersion technique and chemical analysis can conclusively detect this new coating on tanzanite.

Pleochroism

The coating is being applied on pale coloured stones and not on purely colourless and as a result some sort of pleochroism will still be seen in these stones, hence pleochroism does not help in detection of these coated stones.

Magnification Features

The most important part of identifying a coated stone is to observe the surface features which include chipped off areas especially along the facet edges and the unevenness of coated substance. Here, in case of coated tanzanite it was quite difficult to observe these features at lower magnification (with 10x loupe). However, at higher magnification with proper illuminations and careful observations one can make out these features. Some of the features observed in the coated tanzanites tested at *GTL include:*

Iridescence : When the sample was observed in reflected light using fibre optic, fine iridescence was seen along with the chipping of coated material. The latter feature is typically associated with the coated stones, but iridescence is not commonly observed in all coated materials.

Figure 2a

Figure 2b

Chipped facet junctions : When viewed in immersion using transmitted diffused light, abrasion or chipping of coating material was easily observed. The facet edges appeared light coloured or colourless showing the original body colour.

These two features conclusively identified coating being done on these stones which are consistent with those reported by Shane F. McClure and Andy H. Shen.

Figure 3

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In addition to the magnification features, chemical analysis using EDXRF proved to be an important method of identification and also gave important clues regarding the nature of coating. In routine, while using EDXRF, stones are analyzed from the largest flat surface, i.e. the table. However when these stones were analyzed from the table facet, no distinct peak of the coated substance was detected (figure 4.a). But, coating can be applied only on pavilion facets as well as in case of diamonds. Hence, we analyzed the stones from the pavilion facets too and the results were striking. The spectrum displayed a distinct Cobalt (Co) peak (figure 4.b).

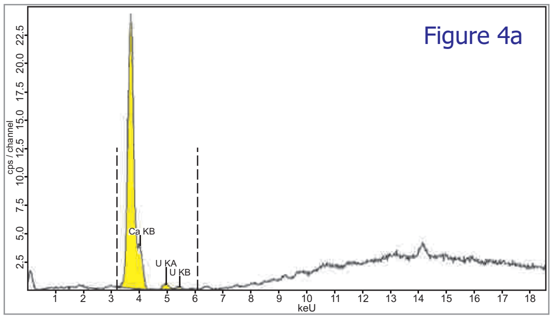

Figure 4a

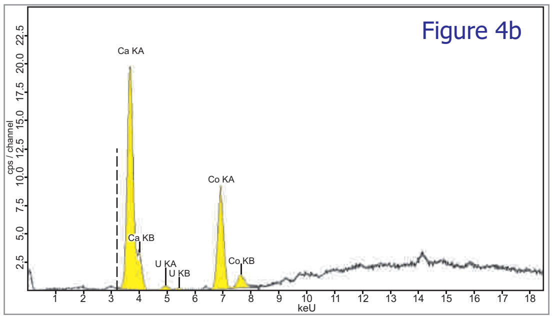

Figure 4b

Therefore, EDXRF analysis revealed Co as the coated substance giving an intense blue colour which was detected only on the pavilion facets. Hence, one has to be careful while using this method of analysis.

Although the gemstone industry is quite familiar with the heating of brown / green zoisite that turns to a rich blue of tanzanite, these stones provides a new dimension to the treatments of tanzanites. This treatment is majorly applied on the smaller sized calibrated stones, hence fine and deep colours which are quite rare in uncoated stones in such sizes should raise some suspicion.

The identifying features like iridescence and/ or chipping of coating material are a result of wear during storage in packets with other stones. However, if stored / kept individually we might not observe any of the features given above therefore making identification of these coated stones a real challenge especially for non-equipped individual like a dealer. Anyone working with tanzanite should check cautiously for this new coating, especially on larger stones that are kept in individual packets which are not subjected to scratches and abrasions. Nevertheless, with careful examination using gemological microscope (using reflected light and immersion technique), coating can be detected. Further confirmation can be made using an EDXRF, which is available only with well-equipped laboratories.

At this stage, penetration of these coated stones is not known but there is always a possibility of deep dissemination if not carefully and properly handled or disclosed. This is just another example that each and every gemstone should be comprehensively examined to detect the presence of treatments and ....only the time will tell the consequences of this new treatment on the tanzanite trade........

GTL....Recent Publications.....

In addition to the certification and educational activities GTL is also involved in research and publishing articles in various national and international journals. Some of the reputed journals in which our work was published in the last one year or so are Gems & Gemology by Gemological Institute of America, Gems & Jewellery by Gemmological Association of Great Britain and The Australian Gemmologist by the the Gemmological Association of Australia.

Gems & Gemology

Choudhary G. & Bhandari R. (2008) A new type of synthetic fire opal: Mexifire, Vol. 44, No.3, pp 228 - 233

Choudhary G. (2008) An interesting zoned sapphire crystal from Winza, Tanzania, Vol. 44, No.3, pp 270-272

Fernandes S. & Choudhary G. (2008) A tourmaline crystal within a crystal, Vol. 44, No.3, pp 272 - 273

Choudhary G. (2008) Two interesting synthetic rubies, Vol. 44, No.3, pp 279 - 281

Choudhary G.(2008) An interesting opal, Vol. 44, No. 2, pp 172- 174

Choudhary G. (2008) A sapphire with en echelon inclusions, Vol. 44, No. 2, pp 180-181

Choudhary G. (2008) An interesting synthetic sapphire, Vol. 44, No. 1, pp 87-88

Choudhary G. (2008) Lead glass-filled color-change sapphire, Vol. 44, No. 1, pp 88 -89

Choudhary G. & Golecha C. (2007) Now synthetic beryl simulating "Pariaba" from Tairus, Vol. 43, No. 4, pp 385 -387

Choudhary G. & Golecha C. (2007) An unusual YAG with a "reverse" color change, Vol. 43, No. 4, pp 387 -388

Gems & Jewellery

Choudhary G. (2008) Multi-coloured synthetic quartz, Vol. 17, No.3, pp 14 - 16

Choudhary G. (2008) Innovative composites 'Fusion', Vol. 17, No. 2, pp 20- 22

Choudhary G. & Golecha C. (2008) 'Paraiba' tourmaline and similar looking materials, Vol. 17, No. 1, pp 16 -18

The Australian Gemmologist

Choudhary G. & Golecha C. (2008) Note from the laboratory Anglesite, An unusual collector's gemstone, Vol. 23, No.7, pp 314 - 315

Red 'Labradorite / Andesine' – what next?

The gem industry and the controversies always run parallel as we have witnessed few in the recent past like' beryllium treated' corundum which was followed by 'lead filled' rubies and now red feldspars which are being sold as red labradorite / andesine by many tele-shopping or internet marketing firms. Red feldspar (labradorite / andesine) considered to be an unusual and rare colour originally comes from Oregon and is very similar to appearance to that of red oligoclase (sunstone) and as a result carries a good price tag. However, similar material is also been reported to originate from Mexico, Congo or China; these discoveries have flooded the market with red feldspars.

But, the question is how come this unusual and rare colour variety is available in huge quantities.....is there not something suspicious ? Originally, this material was being sold as natural untreated, but however after extensive research carried out by various gem labs throughout the world came to a conclusion that these stones are treated by heating / diffusion processes. As per the dealers, "this material comes out as yellow and is 'only' heated to produce red and/ or green colours".

Again, the statement doesn't seem realistic enough for a simple reason that yellow labradorite is coloured by Iron while red is coloured by Copper. Therefore, only heating cannot produce red colour from yellow. Research has proved that this red colour is produced as a result of diffusing copper in the lattice of feldspar, but is not convincingly identifiable.

Recently, Gem Testing Laboratory, Jaipur also received one specimen of red feldspar (labradorite / andesine) for identification. Presented here is a brief report on the features observed in the encountered specimen that might help in its identification....

The visual colour of the analysed sample was brownish / orangish red with uneven colour distribution (figure 5); this colour pattern was quite unusual for feldspar and appeared something wrong. This initiated us to examine the stone more thoroughly. Basic gemological testing readily identified the stone as feldspar (labradorite or andesine); the properties of both closely overlap hence distinction could not be made.

Figure 5

The stone displayed refractive index varying between 1.560 and 1.570 with birefringence of approximately 0.008 and specific gravity was measured at 2.69. Under desk-model spectroscope, an absorption band was observed in the yellow green region that was consistent with that seen in natural red labradorite / andesine; and a weak red glow was observed in short-wave ultraviolet light. Magnification features revealed the true nature of the stone.

As expected for a labradorite this specimen displayed numerous twin planes / cleavage planes although not throughout the stone. Most interesting feature observed was the colour distribution within the stone which appeared to be influenced by the twin planes; the areas near / along the twin planes appeared colourless or pale coloured (figure 6.a). This resulted in uneven body colour in the stone. The effect was much clearly seen when the stone was immersed in benzyl benzoate and using diffused light (figure 6.b).

Figure 6a

Figure 6b

Most of these twin planes were breaking on the surface and provided important information regarding the treatment performed. Many, no, almost all of the twin planes displayed some translucent to opaque whitish (figure 7.a) to brownish (figure 7.b) substance which are commonly seen in stones subjected to high temperature heating as in case of diffusion treatment. These twin planes are the weaker points in the structure of the stone and hence the diffusion material penetrates at a faster rate as compared to the rest of the stone; therefore, reflecting planes in a natural stone turn translucent to opaque.

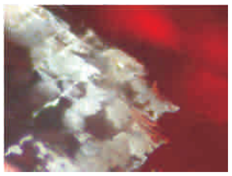

Figure 7a

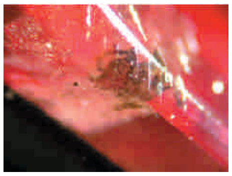

Figure 7b

These treated feldspar do not typically display the features seen in diffused sapphires or rubies like colour concentrations at girdle and/ or facet edges. However, one of the facet edges appeared to be darker as compared to the rest of the body colour of the stone (see again, figure 6.b). In this specimen studied, few identifying features for the treatment were present but we still need to wait for little longer until we check for the consistency of these features in order to issue a report.

In the absence of proof as described above like colour distribution and /or features along twin planes, it becomes extremely challenging to identify this treatment; in such situations one can only assume red and green labradorite / andesine is most likely been diffusion treated.

Zandrite : *a new type of colour- change glass*

In Volume 51, June 2008 issue of the Lab Information Circular, we reported a colour-change glass being marketed as “Alexite” which appeared yellowish green in fluorescent and daylight while brownish red in incandescent light. Recently we had a chance to test few more different types of colour-change glasses which displayed very unusual colour change effects.

Few rough and cut samples were studied which appeared violetish blue in standard daylight (room light), the colour shade very similar to that of tanzanite (figure 8.a). This colour changed to aquamarine blue when observed in fluorescent light (figure 8.b) and purplish pink in incandescent light (figure 8.c).

Figure 8a

Figure 8b

Figure 8c

This type of colour-change glass is being marketed as “Zandrite” and is named after 'Alexandrite' the well known colour-change variety of chrysoberyl. Therefore, in order to take advantage of popularity of alexandrite this new type of colour change glass has been named zandrite. An unknown consumer might make mistake with the name of expensive alexandrite and think they are getting a real stone at such low price. In addition to alexandrite, the colour in daylight also imitates tanzanite and hence it also acts as a cheap alternate to this popular gem.

The gemological properties were consistent with those for a glass. Single refractive index was measured at 1.535 and specific gravity at 2.78. No fluorescence was observed under long-wave or short-wave ultraviolet light, but when viewed with a desk-model spectroscope an interesting spectrum was displayed by this material. The spectrum consisted of numerous lines and bands across the spectrum……this indicated the presence of a rare-earth element (like praseodymium / neodymium) as the colouring element which was also the cause of unusual colour change effect.

Under microscope, these glasses were relatively clean and no distinct inclusions were seen. Hence, these represent high quality stones at cheaper price.

EDXRF analysis revealed the presence of rare-earth element 'neodymium' in addition to silica as expected for a glass; traces of Ca was also detected. This confirms our interpretation of the absorption spectrum and the cause of colour change.

In addition to this blue or purple colour, this glass is also available in green colour which turns to pink under incandescent light, similar to some 'alexites'. However, this gem material provides an alternate to the consumers who wish to wear colour-changing stones at cheaper price; a care must be taken not to mistake this gem with expensive natural stones.

A Glass imitation Hessonite with interesting inclusions

Glasses have always been one of the common imitations submitted at the Gem Testing Laboratory, Jaipur and over many of the past issues we have described various types of glasses with some interesting features and / or inclusions. Recently, we encountered few glass specimens which had some interesting pattern of inclusions. The visual colour appearance of the specimens was very similar to those of brown hessonites (figure 9); hence these were definitely being sold as hessonite imitation.

Figure 9

Refractive index was measured at 1.68 to 1.69 while specific gravity around 3.98–4.00; these values made this glass a good imitation for hessonites. The most interesting part of this glass was observed when magnified.

The specimen consisted scattered crystalline inclusions and some reflecting dots (figure 10.a). At higher magnification, the crystalline inclusions appeared like a star or octahedron with concave faces displaying some surface features which gave appearance of 'Christmas tree' (figure 10.b); similar inclusions have been identified as crystals of synthetic cuprite by Gubelin & Koivula, 1997. In addition few spherical gas bubbles and swirl marks were also present. Such crystalline inclusions may lead to misidentification of this glass as some natural mineral; however careful observations along with the gemological properties will lead to its correct identification.

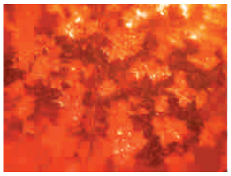

Figure 10a

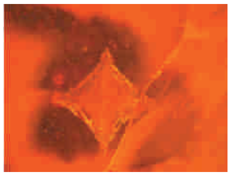

Figure 10b

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