THE GEM & JEWELLERY EXPORT PROMOTION COUNCIL

GEM TESTING LABORATORY

Information Circular

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Tanzanite Dealers.... Beware!!

Tanzanite dealers better be now more careful while purchasing, as a new imitation has arrived in the market ***Synthetic Forsterite.*** *Up till now there were numbers of Tanzanite imitations already existed, which could be identified much easier as compared to this newer material. Some of the already existing materials are Glass, Iolite, YAG, Synthetic Sapphire and treated blue Beryl.*

Forsterite is found naturally as an end member of olivine isomorphous series (Magnesium Silicate), better known as peridot, found in green, yellow green or brown green colours. But, this tanzanite imitation is blue in colour with slightly pinkish or purplish secondary shades.

A number of samples have been tested and certified at Gem Testing Laboratory, Jaipur during the last six months or so and the colour shade was similar for all the samples with slight variations in the secondary shade affected by the strong pleochroism of the material.

All the encountered samples had similar properties like; optic character- anisotropic, biaxial positive; pleochroism- blue, violet and purplish pink; refractive index- 1.645 to 1.680, birefringence 0.035; specific gravity- 3.23 to 3.25; visible spectrum- bands at around 510 and 580 nm; under magnification- pinpoint scattered inclusions and gas bubbles; FTIR absorption till 2000cm^{-1} and small peaks at 2495, 2625 and 2985 cm^{-1}- similar to peridot.

K. Nassau described synthetic Forsterite in 1994 but then it did not become available in the market. That material was said to be synthesized by Czochralski process. Other colours of synthetic forsterite have also been reported including blue-green, colourless and olive green.

Typical body colour with strong pleochroism (blue, violet and purplish pink) makes it the most effective tanzanite imitation.

There is a distinct variation in the refractive index of the two materials; forsterite has the value of 1.635 1.680 with birefringence of 0.035 while tanzanite has 1.690 1.700.

The effect of forsterite's large birefringence can be judged by the strong doubling of back facet edges, which is absent in tanzanite- the fastest test for the separation between the two.

Other common tanzanite simulants like glass can be separated by its singly refractive nature, therefore lack of pleochroism and presence of gas bubbles. Iolite can be separated by its pleochroic colours (blue, violet and yellow/ brown/ colourless) and lower specific gravity (2.58) as compared to the higher of tanzanite (3.33).

YAG is distinguished by higher life (refractive index 1.833), heft (specific gravity- 4.60) and lack of pleochroism (isotropic); Beryl is separated by the lower heft (specific gravity- 2.70) and dichroism.

Synthetic sapphire can be distinguished by the presence of dichroism as compared to trichroism of tanzanite, presence of inclusions (curved coloured bands and gas bubbles) and refractive index (1.760- 1.770).

Be careful and alert when dealing with tanzanite you might encounter this new imitation...

Fracture Filling - New Glass Filled Rubies

Gemstone enhancement has been used all over the world for the past number of years and as a result has become virtually a routine feature in the industry today. Almost every gemstone is being treated or enhanced in one way or the other. Out of various techniques of gem treatments Fracture Filling has become one of the most common, easier and effective way to enhance gem materials.

Fracture Filling refers to the introduction of a foreign material into the fissures or surface reaching cracks in order to make them less visible or invisible. A number of materials are being used as filler and over a period of time there is a continuous change in the type of material used. The choice of material depends on the refractive index of the filler and the stone; for example, oils and resins are used for emeralds while glass is used for rubies and diamonds.

Over the years, people are trying to improve the quality of the treatment so that the treated material reaches up to the international standard.

The fracture filling of diamonds with high lead content glass is being performed from the last two decades and is quite common but now the similar filling has been introduced in rubies as well from the last eight months or so.

The original material is said to be origin of Madagascar with strong brown colouration which is reduced by heating the material at higher temperatures.

The treatment process includes the cleaning of the stones in acid and then immersing in a molten glass, high pressure is applied, which forces the glass to penetrate into the cracks. The glass used here is of higher lead content and therefore refractive index, so that the filler could match up to the RI of the stones.

Up till now even, glass filling was performed on rubies but the effect of treatment was not so effective as compared with the later version. The main difference lies between the two types is the refractive index of the materials. The former filler had a lower RI as compared to the later filler, which affects the

appearance a lot 'the closer the refractive index of filler to the stone, better the appearance after treatment.' Therefore the appearance of these stones changes dramatically.

Identification....

As the identification of the Fracture Filling is concerned one has to keep in mind certain steps / techniques.

Microscope / Magnification

Steps to be followed...

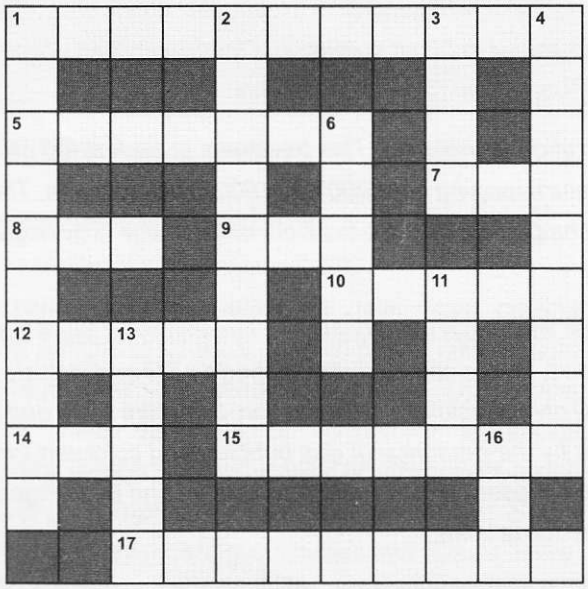
- *Look for a surface break.*
- *Follow the surface break inside the stone.*
- *Look at the appearance of the crack following will be seen;*
    - *Lumpy or uneven filling exhibits cloudy areas.*
    - *High mirror like reflections older version of glass filling in rubies.*
    - *Colour flashes; blue, violet, pink - in diamonds.*

New filling in rubies- these stones exhibit a strong patchy effect / reflections along the surface break or twin planes (in oblique illumination) and strong flashes of violet and blue colour (in dark field illumination).

Only a 10X lens, if observed under proper conditions and illumination can identify these new glass filled rubies.

GTLians' Corner.....

Crossword



HINTS :

Across :

1. a colour changing stone (11)
5. a gemstone made up of only one element (7)
7. gemstone cutting requires an....(3)
8. plate used for polishing gems (3)
9. first step to start mining process (3)
10. sharpest point in a cut gem (5)
12. a manufacturer of synthetic emerald (5)
14. sri-lankan trade name for seed pearls-meaning powder
15. part of stone from which luster is observed (7)
17. dimorph for pyrite (9)

Down :

1. a stone with strong pleochroism as green, brownish green and brownish red (10)
2. material with no specific internal structure (9)
3. first part of other name for rhodochrosite (4)
4. a member of pyroxene group, also found in kimberlite (9)
6. a type of rose cut (5)
11. the force behind diamonds during their journey to the surface (4)
13. local sri-lankan name for gem gravel (5)
16. an animal's eye used to describe gems' optical effect (3)

ANSWERS :

Across : 1 - alexandrite; 5 - diamond; 7 - art; 8 - lap; 9 - pit; 10 - culet; 12 - seiko; 14 - tul; 15 - surface; 17 - marcasite.

Down : 1 - andalusite; 2 - amorphous; 3 - inca; 4 - enstatite; 6 - dutch; 11 - lava; 13 - illam; 16 - cat.

By Chaman Golecha, MDGI, Batch 9

GTL Results.....

Following are the successful candidates from various courses conducted at GTL.

Diploma Course - Batch 32

1. Neha Agarwal - 1st Overall
2. Sandeep K. Vijay - 1st Practical
3. Aparna Pateria
4. Ashish Khandelwal
5. Ashok K. Meena
6. Gomita Sachdeva
7. Jayati Gupta
8. Jharna Oswal
9. Mohammad Sami Akhlaq
10. Mohit Challani
11. Neha Kishorepuria
12. Nupur Kishorpuria
13. Pankaj Kumar
14. Parag Bohra
15. Prashant Gupta
16. Rohit Sisodia

Correspondence Course

1. Neeraj Bohra

Certificate Course

1. Arun Shah
2. Govind Bohra
3. Harkirat Singh
4. Himanshu Mittal
5. Mahipal
6. Manika Jain
7. Marta Pineiro
8. Paridhi Jain
9. Pramit Baweja
10. Rahul Kankaria
11. Rishabh Kumar
12. Vishal Kumar

Masters Diploma in Gem Identification

		Th	Prac
1.	Gulshan Verma	B	B
2.	Priyanka Bhargava	B	B

CONGRATULATIONS TO ALL OUR STUDENTS AND WE WISH THEM ALL THE VERY BEST IN ALL THEIR FUTURE ENDEAVOURS.

WE HOPE THEY WILL MAKE A VALUABLE CONTRIBUTION TO THE GEM & JEWELLERY TRADE.

What's running these days: - Trend...Black...

Black coloured gemstones are highly demanded these days in the gemstone market; this colour is the latest trend throughout the globe. The colour is demanded in dull luster to very bright like adamantine or metallic. At GTL, this coloured stone are being certified on a routine basis. Some of the gemstones found in black colour are Diamond, Cubic Zirconia, Melanite Garnet, Spinel, Sapphire, Chalcedony, Hematite, Jet, Opal, Tourmaline (Schorl) and Glass.

Most of the Black Diamonds encountered were treated by Graphitization technique. This treatment is performed on low quality brown diamonds in which stones are subjected to the temperature ranging from 900°c to 1600°C in a vacuum. These conditions turn diamond into graphite and a partial graphitization takes place along the feathers or cleavage cracks giving black appearance to the stone.

Out of the listed stones few acts as a simulant for each other therefore, individual identification is necessary as there is a lot of price variations amongst these especially Cubic Zirconia for Diamond. These can be distinguished by SG and inclusions;. Melanite Garnet can be identified on the basis of heft and luster RI will give conclusive identification; Sapphire by RI and heft and/ or inclusions. Jet by its characteristic luster and low heft, Glass by the presence of gas bubbles and coloured swirls, Hematite by its metallic luster, Opal by very low heft and phenomena if present and Tourmaline by its RI and Birefringence. The properties of the commonly available materials are given in the following table.

Stone	Optic Character	RI	SG	Inclusions / Other Features
Diamond	SR	2.417 Over range	3.51	Feathers, Gray dotted inclusions cleavages/ feathers, Bearding
Cubic Zirconia	SR	2.09 – 2.18 Over range	5.40 – 6.20	Sub- Adamantine luster, No Bearding
Melanite Garnet	SR	1.80 – 1.94 Over range	3.70 – 4.10 usually 3.84	Bright Vitreous Luster
Spinel	SR	1.835 – 1.92 Over range	4.00 – 4.40	Bright Vitreous Luster, Cleavage Cracks
Sapphire	DR, Uniaxial	1.760 – 1.770	4.00	Twin Planes, Fingerprints, Crystals
Chalcedony	AGG	1.540	2.58 – 2.65	Banding
Hematite	DR, Uniaxial- Not useful	2.94 – 3.22 Over range	4.95 – 5.16	Metallic Luster, Dark Brown/ Red Streak
Jet	Amorphous	1.66	1.30	Dull Luster, Brown Streak, soft appearance
Opal	Amorphous AGG / SR	1.44 – 1.47	2.00 – 2.20	Cloudy inclusions, crystals, flow lines
Tourmaline	DR, Uniaxial	1.62 – 1.64 0.020	3.02 – 3.10	Bright Vitreous Luster, Birefringence
Glass	SR	1.45 – 1.60 SR	2.40 – 2.80	Gas Bubbles, Coloured Swirls, Hemispherical pits

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