LAB INFORMATION CIRCULAR

Volume 36 August 2003

GEM TESTING LABORATORY... 31 YEARS OLD!!!!

It is 31 years now since GTL has come into existence. It all began in the late 1960's, synthetics were circulating in the trade, stones were being heated and treated to improve their appearance and even the leading Indian jewelers were, in general ignorant of the technological advances outside the country.

At that time, to gain the faith of the clients especially, who were involved in the foreign trade, ***(Late) Padmashri Khailshankar Durlabhji*** dreamt of a body that can provide a technical backup to the Indian Gem and Jewellery Industry. A few far sighted and dedicated people supported this dream such as ***Shri Manubhai Shah, Shri K.V. Dave, Shri. Khosla and Shri Jawaharlal Rakhyan*** with the technical support of one of the world's leading gemmologists, ***Mr. Basil W. Anderson*** of Gemmological Association of Great Britain, who worked out the basic requirements for a laboratory at Jaipur.

GTL has achieved a lot and has gained recognition today, with the joint efforts of ***Shri Rashmikant Durlabhji, Shri Vimal Chand Surana, local working committee members and GJEPC.***

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INSIDE THIS ISSUE.....

THE PINK -ORANGE SAPPHIRE..... AN OVERVIEW...

These days every person in the field of gemstones whether, a trader or a gemologist is in confusion by this orange- pink "padparadscha" shade corundum. No one want to buy these stones, as all of them know that these stones are treated, but what exactly it is ????

Most corundum is heat treated to improve its appearance- its colour and clarity. This heat treatment is being done on Corundum from centuries, but with the beginning of the new century, a new treatment has reached the gemstone market in large quantities that has created a lot of unpredictability of the nature of the stone. The major problem being faced is the identification of these stones.

Every one who is in the trade, especially one who is dealing in sapphires, must have encountered the *"Pink- Orange Padparadscha"* in recent times, very frequently.

But, until 2001 these stones were very rare, so the question arises,as to how the market has suddenly been loaded with these sapphires. There is something wrong, either they are synthetics or treated, and the treatment that can give very constant results in terms of colour.

Finally, in early 2002, these stones were exposed as treated to the trade by few world -renowned laboratories like GIA Gem Trade Laboratory, AGTA Gem Testing Center, SSEF, etc. A lot of research work has been done from a simple microscope to all advanced techniques including highly sophisticated techniques known as LA-ICP-MS (Laser Ablation Inductively Coupled Plasma Mass Spectroscopy) and SIMS (Secondary Ion Mass Spectroscopy).

At the initial stages, a major controversy arrived when certain gemologists and scientists called them as treated, while few called it synthetic overgrowth on a natural seed.

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The dream was finally realised on 12th August 1972, when Gem Testing Laboratory was formally inaugurated by the then ***Chief Minister Shri Barkatulla Khan.***

Shri Vinod Gupta, the first Gemmologist at GTL, followed by several other gemmologists including ***Shri Verma, Shri N.K. Tatiwala, Shri Shekhar Vashista***, and ***Shri Anoop Bohra*** for short periods took over the responsibility of GTL for 18 years. In January 1990, ***Shri Khailshankar Durlabhji*** reopened GTL under the charge of ***Smt. Shyamala Fernandes***. Since then, she received useful assistance from ***Shri Vikas Joshi, Shri Sunil Sarma, Smt. Ritu Bhardwaj, Dr. Rekha Tripathi, Shri Manish Kumar, Shri Mustaqeem Khan, Shri Gagan Choudhary and Smt. Meenu Vyas.*** At present GTL is working with three gemmologists namely, ***Shri Mustaqeem Khan, Shri Gagan Choudhary and Smt. Meenu Vyas.***

After 1990, under the charge of Shyamala Fernandes, GTL made a gradual progress in terms of its services to the gem trade, which includes certification, gemmology courses, research works, etc.

Gemmology courses were commenced in October 1990 with the Diploma Course in Gem Identification with 8 students. In the current batch, there was an overwhelming response of 40 students.

In December 1999, the **Masters' Diploma in Gem Identification** was launched in order to make the technical background of a candidate sounder so that he/ she can take up a post as a gemmologist in a laboratory or be an expert jeweler- gemologist. This course has become very popular among the students who wish to opt for a career in the technical aspect of the industry also.

Other Courses include- Correspondence Course in Gem Identification, Certificate Course in Gem Identification, Short Courses (Navratna, Specific Stones like emerald etc.), Refresher Courses on Synthetic and Enhancement for Ex-students, Courses for GJEPC members- individual and group. GTL is also the Allied Gem Tutorial Centre (AGTC) for training and conducting Gemmology Exams on behalf of Gemmological Association of Great Britain. GTL is the only laboratory in the country to get "exemption" from the preliminary diploma examination of Gem A, UK.

In 12 years over 785 students from all over India and abroad have benefited from these educational activities.

GTL , initially acquired two sets of basic instruments, one as back up. At the current date it has employed more than seven sets for the educational purposes as well as for certification.

Due to the newer technological advancements in the synthetics and treatments, an advanced technique was required and this need was fulfilled with the installation of FTIR spectrometer in 1998. GTL is the only laboratory in the country, which employs this technique in gem identification and research works. To work with this advanced technique was not so easy, because of lack of expertise in the country and database to work with. In this connection ***Dr. Hanni*** of SSEF helped the gemmologists at GTL in preparing its own database, and today GTL has the data on almost every common stone. It took three years to reach this state with the joint efforts of Shyamala Fernandes, Dr. Rekha Tripathi, Mustaqeem Khan and Gagan Choudhary.

Research works and paper presentations were initiated right in early 90's by Shyamala Fernandes and were well supported by the assistants. As a result several papers were presented at national and international seminars and conferences. Recently in January 2002 at ICA congress held at Jaipur, Smt. Shyamala Fernandes presented papers, and as a result GTL earned a lot more recognition.

A number of national and international guests and visitors have graced GTL. To name a few are **Dr. Henry Hanni, Mr. Israel Eliezeri, Mr. Shane Mcclure, Mr.Roland Naftule, Dr. Sakta Siripant, Yehuda Kassiff, Thomas Lind, Ya'akov Almor**, Including Working Committee Members & GJEPC Chairmen.

GTL has prepared its own working and laboratory manuals as standards to be followed in which all the rules and regulations, working criteria of all the courses are being laid down. A laboratory manual has been prepared after long and tough times spent with the discussions and inputs with different gemmologists in India and abroad so as to keep the certification wordings neutral. It almost took three years to

Continued.....

complete the manual and it contains all the rules, conditions, and report wordings for treated stones, etc. which helps to keep the testing report neutral and constant.

Certification of gemstones is another main activity of GTL. Certification has been divided into different categories as Single stones- Regular / On The Spot, Bead Strings, Packet Lots, etc.

In October 2002, a new category has been introduced as "***On- Request***". This category includes the certification of Treatments like Fracture Filling and Heat Treatment in Corundum.

As Jaipur is considered as the major gemstone market, almost all types of gemstones are being encountered including some new discoveries, synthetics, treatments, etc. therefore, certification has become a lot more challenging than ever before like in 1980's or early 90's. A complete amendment of the older system for gem testing gave an immediate response in the increase in the number of stones brought in for testing. In 1991 only 963 stones were certified, while in the financial year 2002- 03, a total of 4040 stones + Bead String of 80 centimeters was tested. GTL also took an active part in ICA congress in January 2003 by testing 565 single stones and 1520 centimeters of bead strings.

A new certificate format was introduced in October2002 with a photograph of the stone being tested, embossed logo and lamination to prevent the certificate from being tampered.

A look at the changes.....

THE GEM & JEWELLERY EXPORT PROMOTION COUNCIL

SPONSORED BY MINISTRY OF COMMERCE, GOVT. OF INDIA

GEM TESTING LABORATORY

(Recognised by Ministry of Commerce, Govt. of India)

RAJASTHAN CHAMBER BHAWAN, M.I. ROAD, JAIPUR-302003 Phone 568221, 573565

GEM IDENTIFICATION CERTIFICATE

Ref. No. : E9755CA19458 (O) Date : 23/10/2002

NAME : TO WHOM IT MAY CONCERN

The information contained in this certificate reflects the result obtained at the time of issue. To the best of our knowledge and ability the specimen submitted for examination is identified as -

"NATURAL AVENTURINE QUARTZ"

The results obtained are as follows :

Weight	: 16.30 cts
Colour	: GREEN
Type of cut	: ROUGH
Dimensions	: N.A.
Refractive Index	: N.A.
Conclusions	: RESULTS CONFIRM NATURAL ORIGIN.
Specific Comments	: AVENTURESCENT EFFECT SEEN.

For GEM TESTING LABORATORY

MUSTAQEEM KHAN, MDGI — GAGAN CHOUDHARY, MDGI

Tests Carried out for confirmation

R.I.☐ S.G.☑ Pleochroism☐ Magnification☑ U.V. fluorescence☐ Abs. Spectrum☐ IR Spectrum☑

A Sample of older Certificate being issued without any photograph and lamination.

THE GEM & JEWELLERY EXPORT PROMOTION COUNCIL

GEM TESTING LABORATORY

(Sponsored by Ministry of Commerce, Govt. of India)

Rajasthan Chamber Bhawan, M. I. Road, Jaipur-302 003
Phone : 2568221, 2573565, Fax : 91-141-2567921
E-mail : gtljpr_jp1@sancharnet.in

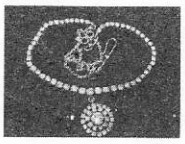
DIAMOND IDENTIFICATION CERTIFICATE

Ref. No. : F1436CA21528 (M)/CTS Date : 09/06/2003

NAME : TO WHOM IT MAY CONCERN

The information contained in this certificate reflects the result obtained at the time of issue. To the best of our knowledge and ability the specimen submitted for examination is identified as -

"NATURAL DIAMOND (2)"



The results obtained are as follows :

Weight	: 79.47 cts (Total Weight)
Colour	: YELLOW / LIGHT PINK
Type of cut	: ROUND BRILLIANT
Dimensions	: N.A.
Refractive Index	: 1.810 (OVER RANGE)
Conclusions	: RESULTS CONFIRM NATURAL ORIGIN.
Specific Comments	: STONES TESTED: CENTRAL PIECE IN PENDANT AND SECOND LEFT FROM CENTER IN NECKLACE. TOTAL WEIGHT OF TESTED STONES + OTHER WHITE, YELLOW AND LIGHT PINK STONES + WHITE METAL NECKLACE.

For GEM TESTING LABORATORY

MUSTAQEEM KHAN, MDGI — GAGAN CHOUDHARY, MDGI

Tests Carried out for confirmation

R.I.☑ S.G.☐ Pleochroism☐ Magnification☑ U.V. fluorescence☑ Abs. Spectrum☑ IR Spectrum☐

A Sample of amended laminated certificate with the photograph of the stone being tested

On the occasion of 31st GTL anniversary, FREE Gem Testing services have been given for two days - 11th and 13th of August 2003.

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crystal, the reason being the stones were exposed at a very temperature near to the melting point of the corundum. At such a high temperature, some part of the corundum has melted and re-crystallized.

The Treatment....

The treatment was initiated in Thailand on pink sapphire to change to orange with a pinkish orange padparadscha shade. And now almost every shade of corundum is being treated this manner.

The reports from the world -renowned laboratories like GIA Gem Trade Laboratory, AGTA Gem Testing Center, SSEF, etc clearly show that the main colour- causing element is the presence of Beryllium in the structure of Corundum.

Beryllium is a controlled substance in many countries because it is very poisonous in its pure form, but not when it is bonded with other atoms, as in the case of Chrysoberyl.

Beryllium is not a part of composition of Corundum. Therefore, it means it has been diffused into the structure of corundum by heating.

The corundum is heated at the elevated temperature of around 1780°C to 1850°C for 100 hours.

In this treatment, light / pink coloured sapphires are heated with Chrysoberyl. During the heating beryllium from Chrysoberyl penetrates or diffuses into the structure of corundum and displaces aluminium and forms colour center/ defect hole producing a pink- orange shade imitating *Padparadscha*.

Beryllium when present in a stone gives yellow colour, as in case of pink -orange sapphires, the yellow colour when superimposed on pink colour, gives a orange tint to the stone. Similarly, pale yellow coloured sapphires from Songea are turning into rich yellow to brown shades.

Then the problem arose of naming the treatment, few called it *diffusion* treatment while others named it *bulk diffusion* (the correct technical term). The term bulk diffusion was given due to the fact that the colour causing impurity has penetrated up to the core of the crystal and not just in a thin layer near the surface.

This treatment is now known simply as "Beryllium Diffusion", whatever may be the colour. The treatment as stated is performed on any colour of corundum, but as in case of rubies it changes the colour from purple red to orangey red, it creates the problem in certification of stones whether to call the stone a ruby or a sapphire because of the orange tint.

Every gemological body in the world is using their own wording, as there is no standard has been evolved so far. Few call them Bulk diffusion while some call them surface diffusion.

Another major problem being faced by the gemologists and traders throughout the world is how to identify these stones!!!!!

The identification of these stones is very difficult with the classical instruments or routine tests.

Like in the case of simple surface diffusion of blue sapphires and rubies, this treatment does not show any colour concentrations on girdle or patchy facets.

If present, these stones might show an *internal colour rim* when immersed in Bromoform or Methylene Iodide liquid and viewed in diffused white light.

All Indian and International laboratories are facing problem in certifying these stones as beryllium detection is the conclusive proof of the treatment, and it cannot be detected by routine tests.

Without elemental analysis, the treatment can be detected

- if an internal colour rim is visible in immersion.
- But again the problem is the detection of beryllium with commonly available equipments like FTIR, EDXRF, LRS, or SEM is almost impossible, as these techniques cannot detect the elements having atomic number less than 12. Beryllium cannot be detected by these methods, as the atomic number of beryllium is 4.
- The beryllium can be detected by a highly sophisticated technique known as LA-ICP-MS stands for Laser Ablation Inductively Coupled Plasma Mass Spectroscopy.
- But only one or two laboratories in the world have access to this instrument and the technique is a partially destructive one and extremely expensive.
- The other way if one can get features like the characteristic body colour of the stone and inclusions of heat treatment like diffused silk, burst halos, healed fingerprints, then it may be possible to identify

Continued .....

Initially in May 2002, GIA and AGTA formulated disclosure policy for these treated stones as:

The new wording reflected two significant determinations with regard to these treatments:

Following were the report wordings:

- The induced colour, whether present as a rim close to the surface, or continuing throughout the stone, is caused by a process known as bulk diffusion.

  Group/ Species : **Natural Corundum**

  Variety : **Sapphire/ Ruby**

  Treatment comments : **indications of heating and of surface related colour created by bulk diffusion.**

- Overgrowth of synthetic material occurs during the treatment process and is still present on the finished stone.

  Group/ Species : **Natural Corundum**

  Variety : **Sapphire/ Ruby**

  Treatment comments : **indications of heating and of surface related colour created by bulk diffusion; areas of synthetic overgrowth are present.**

Recently, a **unified disclosure policy** has come up from the **AGTA-GTC, GIA-GTL, Gubelin Gem Lab** and the **SSEF** to agree upon a similar report wording as:

- The name 'Padparadscha' will not be applied to these newly treated sapphires.

- On all reports the following statements will be made

  Species : **Natural Corundum**

  Variety : **Treated (Orange) Sapphire**

  Treatments/ Comments : **Indications of heating.**

  The orange colouration of this stone is confined to a surface related layer.

At GTL, Jaipur, this treatment is certified only in case if internal rim is visible as proof.

The stone is certified as :

"Natural Sapphire (Artificially Coloured)"

Comment: This stone has been treated by the diffusion process. Some or all of the colour is artificially created and lies below the surface in a thin layer which maybe removed with reploishing or recutting.

Gem Testing Laboratory Results .....

Following candidates have been declared successful at the **Diploma Examination** in Gem Identification held from 25th to 28th May 2003 for the Batch 27.

1. Rohit Chabbra - 1st Overall
2. Ritesh Jain - 1st Practical
3. Amit Sonthalia
4. Gajraj Singh
5. Gaurav Srivastava
6. Jackson Mtonga
7. Julian Chamululu
8. K.K. Bhatia
9. Kanhaiya Goenka
10. Makhdoom Khan
11. Mohammad Ikramuddin
12. Neena Khandelwal
13. Rishi Nagpal
14. Rohit Singhal
15. Shravan Kumar Khatri
16. Sweta Jijja
17. Vivek Patel

Certificate Course in Gem Identification

1. Amrita Periwal
2. Deepak Jain

Field Visits :

The 27th Batch of Diploma students visited the jewellery units of Amrapali and Dwarka's. These visits have provided them with a valuable insight into the manufacturing process of gemstones and jewellery.

Our Grateful Thanks

We are highly obliged to **Shri Rahimulla Khan (Ms. Vaibhav Gems) Shri. Satish Saklecha, Shri S.K. Ajmera, Shri Rajesh Ajmera (Amrapali), and Shri. Rajiv Arora** for providing In House training for students of the Masters' Diploma. Their continued support and encouragement is deeply appreciated.

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

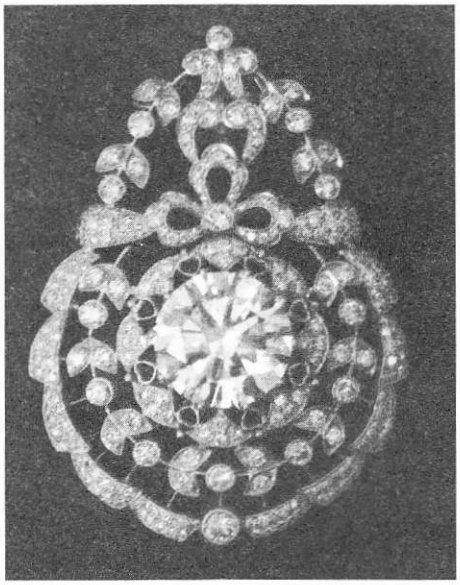
WE HOPE THEY WILL MAKE A VALUABLE CONTRIBUTION TO THE GEM & JEWELLERY TRADE.

Stone News - Some interesting stones through GTL .....

Maw- Sit- Sit: The material was submitted for testing weighing 36.93 carats, and measuring approximately 33.90 X 24.90 X 5.60 mm. It was identified on the basis of its characteristic pattern and texture using a microscope and references from different gemmological texts and Internet. The material was opaque with a vague RI reading at around 1.66 and SG of 3.06 measured by hydrostatic method. The material was inert under Chelsea filter and ultraviolet lamp, and showed a weak absorption in yellow green region of standard spectroscope.

Maw -sit -sit is the name of a village in Burma and is the only source for a material known as Maw-Sit-Sit, which is basically a bright green coloured rock with black and white patches, veins and streaks. The exact mineralogical composition varies from author to author but it believes to be consisting of many different minerals like Albite, Kosmochlor, Chromite, and Natrolite and amphibole group of minerals.

Demantoid Garnet: Deep Emerald green stone with a high life and good heft was submitted for certification. Visually the material looks like Tsavorite garnet, but after taking refractive index Tsavorite proved wrong. The RI was over the range of standard refractometer and SG was 3.83 calculated by hydrostatic weighing. A strong band at around 445 nm with weak lines in red was visible due to presence of chromium. The stone displayed strong growth zoning, under magnification, square in shape very similar to as seen in synthetic diamonds.



This type of zoning is uncommon in garnets, they commonly display a rhomb shaped zoning. Some other inclusions included bundles of whitish fibers, but not giving a horsetail pattern, which is specific for demantoid garnets. The Infra red spectra showed a characteristic absorption for andradite garnets.

Coated Apatite: Emerald green stone, oval perform with partially polished table, weighing 5.72 carats measuring 12.42 X 9.80 X 5.91 mm was submitted as emerald for testing. The spot RI was measured around 1.64 and SG as 3.20 by hydrostatic method. These properties identified the stone as Apatite, but when the stone was examined under microscope, green coloured paint like material was coated on the surface with some wrinkling effect. A strong band at 650 nm was observed under a standard prism type spectroscope due to the coated material. This was something unusual, as coating is commonly done on glass or quartz rather than a stone like apatite.

A 20-carat Colourless Diamond: Colourless, internally flawless and weighs approximately 20 carats. It was a pleasure testing such a diamond; the stone was internally flawless with naturals on the girdle and a weak bearding. The stone was set in a brooch as the central piece measuring 17.40-girdle diameter, with a number of other colourless to light yellow diamonds around it. The diamond was identified as Type I with FTIR, with a strong line at 415 nm and strong blue fluorescence under ultra violet lamp.

Fancy Coloured Diamonds: Fancy coloured diamonds with blue, brown, green, black, and pink colours are a regular feature testing these days. Most of theses stones are irradiated or heat-treated except the pink colours. The majority of these stones are set in a ring or any other jewellery piece. These stones are certified as natural with a comment on irradiation / heat. All these stones showed some or the other inclusions with strong strain and spectrum around 495 nm.

Cherry Coloured Glass: A pink rough weighing 229.81 carats was submitted. On closer examination, the body of the material was colourless and it had veins, clouds and bands of pink colour with spherical gas bubbles. The material exhibits an ADR effect under polariscope. The RI and SG were not possible due to the rough stage and weight of the material and it showed a patchy chalky orange and green fluorescence under UV. FTIR confirmed the material as glass.

G.T.L. ians'...corner!!!

Smt. Fernandes Resigns from GTL...

Smt. Shyamala Fernades resigns from GTL last month after a long and invaluable service of more than 12 years.

She joined GTL in January 1990 as the Gemmologist- in-charge, under the convenership of Shri Rashmikant Durlabhji, when (Late) Padmashri Khailshankar Durlabhji reopened GTL after a time gap of over two years.

Before joining GTL, she was a faculty member at the Gemmological Institute of India, Mumbai, from 1981 to 1989.

Since 1990, she has been in charge of GTL, Jaipur and during this period has initiated a number of activities - certification, educational and research oriented.

GTL today is a premier institution and laboratory in the country and has a number of firsts to its credit with the support of the Council and her efforts. Few of them are:

- GTL was the first Indian laboratory to introduce the sealing facility for tested gemstones, a laminated certificate with the specimen photograph and to provide an optional facility for certification of enhanced gemstones.
- GTL is the first institute to introduce an intensive Masters Diploma in Gem identification with in house office training.
- GTL is the first and only laboratory in the country, which has the "exempt" status for GTL students taking the Diploma examinations being conducted on behalf of the Gem A (UK) at Jaipur.
- GTL is the only laboratory, which has an FTIR spectroscope and has prepared its entire database in house and a comprehensive one with the tough time spent with the instrument.
- Smt. Fernandes has presented a number of papers at National and International Seminars, which has earned a lot of recognition for GTL.
- She has prepared the Textbooks being utilised for all the educational courses.

GTL wishes her ALL THE VERY BEST for the future.

Treatments... Why?????

Gemstone, the child of Mother Nature
Takes birth after a long gestation time
With unique features and exceptional character
Each child is a masterpiece.

People talk about peace and unity
Protest atomic explosion and wars
Why they explode those tiny crystals
Where are those people now.....?

Gemstones do have feelings
They speak in silence
They too express their objection
For treatments done on them.

They cry by their melted crystals
Crystals burst out as glassy halos
Dehydrated tell tale feathers
Leave 3rd degree burns as pockmarks.

Enjoy the beauty of gemstones
Accept those children as they are
Oath, not to kill those wonderful kids
In the name of treatment!!!!!!!

By R. Lalitha
(MDGI, GTL, Batch No. 6)

Find out the answers for the following simple questions and arrange first letter of each one in the given order :

1. a natural gemstone that can scratch sapphire.
2. a gemstone with eye visible strong pleochroism as violet blue/ pale yellow/ blue.
3. a gemstone with lily pad inclusions.
4. a gemstone with blue body colour, golden spots of pyrite, and white calcite.
5. a natural gemstone with play of colour, and light heft.
6. a gemstone with black/ green banding ,also known as kidney stone
7. a gemstone with insects as inclusions.

See , what do you get!!!!!!!!

Ans. DIPLOMA

By Puru Agrawal

(MDGI, GTL, Batch No. 6)

The Masters' Diploma in Gem Identification (MDGI)

Some Facts.....

About : The **Masters' Diploma in Gem Identification** was launched in order to make the technical background of a candidate sounder so that he/ she can take up a post as a gemmologist in a laboratory or be an expert jeweler- gemologist. This course gives the maximum opportunity to the students who wish to opt for a career in the technical aspect of the industry.

Exemption : Successful completion of the course will enable the student to avail of the "Exempt" status for appearing in the Diploma Examination in Gemmology, Gem A (UK). A candidate need not to appear for preliminary/ foundation examination.

Syllabus : A brief listing:

- **Crystallography** - Crystal systems, crystallographic axes, elements of symmetry, common stones. All the possible common Forms and Habits, Surface markings and twinning with reference to specific stones in the crystal systems / sub - classes - with Bibliography.
- **Instrumentation**: Principle, usage, applications, limitations, accessories, makes available and costing. All classical instruments and advanced techniques like FTIR, EDXRF, SEM, LRS, UV-Vis-NIR, LA-ICP-MS, with practical only on FTIR.
- **Synthesis** - All Gemstones which are synthesized, Methods involved, Manufacturer / Trade name, Identification features - Flame fusion, Czochralski, Ceramic methods, Gel growth, Flux fusion, Hydrothermal, Imitations and Composites.
- **Enhancements** - Type of Treatment / Enhancement, Materials and parameters used, Stability, Identification features for specific gemstones Colourless and coloured impregnation (fracture filling / porous), dyeing, staining, foiling, spraying, coating, laser drilling, heating, HPHT, diffusion and irradiation.
- **Gem species** - Properties & characteristics, Sources (with origin determination where possible), Synthesis and enhancements, Assortment & evaluation. Emphasis and detailed work on Beryl, Chrysoberyl, Corundum, Diamond, Feldspar, Garnet, Quartz and Pearl. Other 76 Gem species in alphabetical order.
- **Faceting** - Each candidate will have to facet two distinct cuts on an Israeli faceter - from the preform stage to the finished cut.
- **International Certification standards** - Laboratory certification; Trade norms and regulations; International controversies and ethics.
- **Trainee program**: Will involve in-house training at jewellery houses in and around Jaipur. These programs include Emerald assortment (one week), in house complete production line training (two weeks), in-house jewellery manufacturing (one week). Optional training can be arranged for candidates for Diamond Grading, Pearl culturing etc. (Additional Fees to be borne by candidates).
- **Project Work**: Specialization in a topic - Researching and Analyses; Market Survey and Data collection; Data analysis and conclusion.
- Candidates will have to present lectures for the on-going Gemmology courses.

Some Comments: From the Current batch of Masters' Diploma in Gem Identification.

- It is a very useful course in the field of Gem Identification. It is interesting only when oneself creates the interest for knowing the criteria behind the Gem world. The Cause " How and Why" behind every property.

  - Ashish Sharma

- Maximum depth information for Gems and their imitations. It is like this and depends on you till what extent you want to go and nothing else seems to be better.

  - Puru Agrawal, Vivek Agrawal, Ikramuddin& Gajraj singh.