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Non-resin type synthetic opal by Kyocera

By Masaki Furuya[1] and Satoshi Miyazaki[2]

Synthetic opal, named "Kyoto opal" by the producer Kyocera Co., Ltd. has been used as an imitation for natural opal since the 1970s. Recently, the unfamiliar synthetic opal, which does not use resin for the bonding of silica spheres, was taken for testing to our laboratory. It is said that this synthetic opal by Kyocera Co., Ltd. is not new but was promoted recently for its high heat resistance. In this article, we introduce the gemmological properties of this synthetic opal.

The non-resin type synthetic opal is colourless and transparent (water opal) or white and opaque (white opal) in appearance. With traditional gemmological testing methods, this non-resin type shows a higher refractive index and specific gravity than the resin type, as shown in Table 1 below. Also, its long wave UV fluorescence is chalky yellow, though the resin type usually shows a bluish white fluorescence. Seen under a microscope, this non-resin type also shows a so-called lizard skin structure (Figure 1). But some of the samples show a unique patch pattern of play of color (Figure 2) .

	Non resin type Syn. opal		Resin type Syn. opal	Natural Opal
	Water opal	White opal		
R.I.	1.460~1.462	1.466~1.467	1.44~1.45	1.44~1.47
S.G.	2.23~2.25	2.24~2.26	1.98~2.20	1.99~2.25

Table 1: Refractive index and specific gravity of various opals

With FT-IR spectrometers, the non-resin type shows less absorption in the 3000-7500cm-1 range than natural opal and the resin type (Figure.3). This is probably due to the low content of resin and water.

The non-resin type is more resistant to heat than the resin-type where heating up to 170C may cause minor cracks and heating from 300C onwards will cause total cracking. (Figure 4). Our testing has shown that the non-resin type synthetic opal will not crack nor go slack when submitted to temperatures of up to 1000C.

The non-resin type does not present a problem for identification because it has the same features as known types of synthetic opal. And with detailed testing, it can be identified as this non-resin type too.

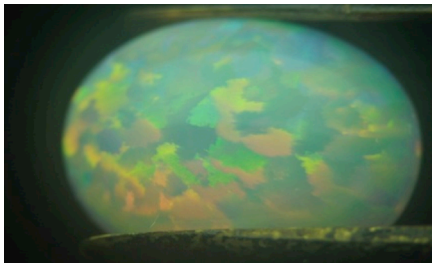

Fig.1: Lizard skin structure of non-resin type synthetic opal

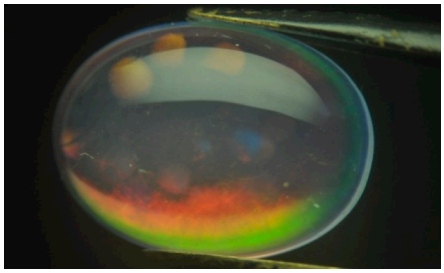

Fig. 2: Patch pattern of play of color of non-resin type synthetic opal

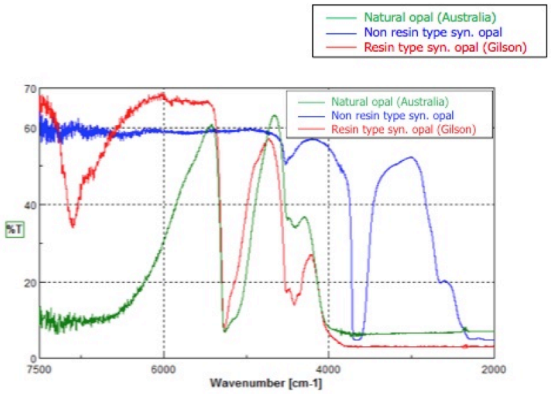

Fig. 3: FT-IR spectra of synthetic and natural opal

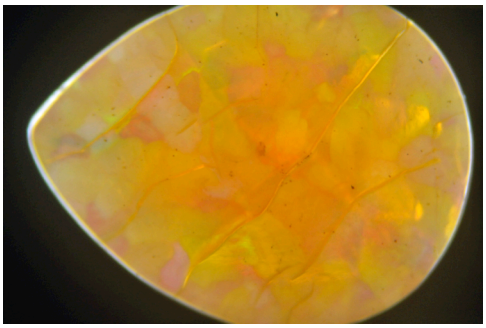

Fig. 4: Cracked resin type opal heated at 300C.

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Collector's Gem Petalite

By Jayshree Panjikar,
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On my recent visit to Myanmar I bought two faceted petalites (8.50carats and 2.00carats) for my collection from the market in Mogok. Having read that Petalite is a 'rare gem and is a real favourite with collectors around the planet', I was very eager to get one. Petalite's name is derived from the Greek word for a leaf "petalon". It is also known as Castorite and has lithium aluminium silicate as its chemical composition.

The bigger stone (8.51ct) shows a perfect cleavage, which appears to have a leaf-like pattern. Colour appears to be a combination of greenish yellow with a pinkish overtone. Under the microscope the smaller specimen (2.00ct) showed a beautiful negative crystal, a large needle-like inclusion and some small crystals of petalite.

Gemmological properties determined were

RI:	1.502 - 1.518
Birefringence:	0.016
Optic Character:	Biaxial+
Pleochroism:	Moderate
Specific Gravity:	2.36 to 2.40

Fluorescence was observed under UV light.

Fig 1: Petalite 8.51 carats

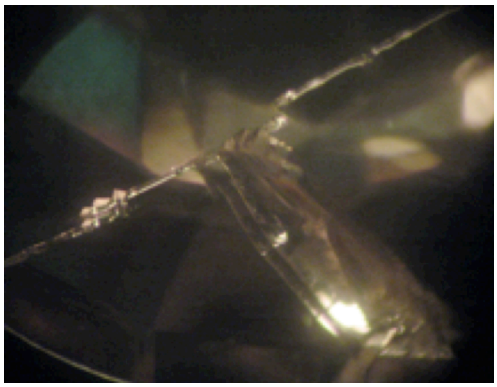

Fig.2: Needle-like inclusion in petalite

Fig. 3: Petalite 2.00carats

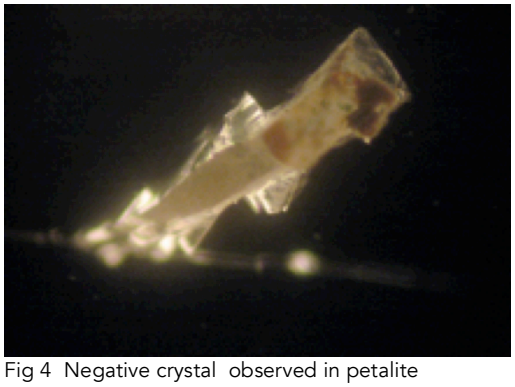

Fig 4 Negative crystal observed in petalite

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The Cheapside Hoard: London's Lost Jewels

Exhibition at the Museum of London
11 October, 2013 to 27 April 2014

Review by Elisabeth Strack,
Gemmologisches Institut Hamburg, Germany

In 1910, the Worshipful Company of Goldsmiths, for centuries owner of properties along the once distinguished Cheapside street in London's East End, decided to tear a number of buildings down. They were situated on 30-32 Cheapside, on the corner with Friday Street, not far from St. Paul's Cathedral and they had been erected in 1667, after the Great Fire of 1666.

When in June of 1912 the workmen started to excavate the cellars, they discovered a heap of jewellery that had evidently survived the Great Fire and the post-fire rebuilding. The workmen brought their findings for sale to a middleman, George Fabian Lawrence, who secured them for the London Museum that was to open only two years later at Stafford House, near St. James's Palace. It was the location where the Cheapside Hoard, as it was named meanwhile, was shown to the public in March 1914. In 1976, nearly sixty years later and after many discussions on the issue of ownership, the Hoard became the possession of the Museum of London, with some items held by the British Museum and the Victoria & Albert Museum (and some items may have disappeared on the way).

The present exhibition at the Museum of London, exactly 100 years after the first showing, is accompanied by a catalogue that provides insight into the historical background. The author of the catalogue and curator of the exhibition, Hazel Forsyth, explores the historical context of London's gem and jewellery trade in the late 16th and early 17th centuries - the time window that is attributed to the making of the jewels in the hoard - publishing many facts for the first time.

In fact, the catalogue is more than just a catalogue, it is a thoroughly researched and highly competent scholarly work.

Around the year 1600, Cheapside was a principal thoroughfare of the city. Goldsmiths had a presence since the 14th century, with their Company Hall in Foster Lane (where it still is today). The company tried to keep an eye on business by concentrating as many goldsmiths as possible in a small area.

The hoard discovered at No. 30-32 is made up of nearly 500 pieces of Elizabethan and Jacobean jewelry (Elizabeth I. reigned from 1558 – 1603 and James I. from 1603-1625). They were either produced abroad or in London and may have made up the stock of a goldsmith. Ownership could never be proved. The treasure includes rings, brooches, pendants, chains and buttons, using different types of gemstones and enamelled gold settings, but also loose stones, beads, cameos, scent bottles, fan holders, crystal tankards and a salt cellar. The items represent luxury goods of the period, making use of colourful gemstones from all over the world.

Fig. 1. The Emerald Watch Case. The case and the lid are probably cut from the same crystal, coming from the Muzo locality in Colombia. Length ca. 3cm. Courtesy: Museum of London.

The most outstanding examples are emeralds from Colombia. Apart from those used in rings with rosette settings, earrings and enamelled chains, three examples are extraordinary. First, a small emerald parrot cameo (ca. 1.8cm in length), second a lizard or salamander gold brooch (length ca. 4cm) with white enamel, set with emeralds and Indian table cut diamonds (Figure 2) and third the emerald-cased watch (length about 3cm) that makes use of a polished emerald crystal (Figure 1). It is not only the most spectacular item of the Cheapside Hoard but it is unique. There exists no comparable example worldwide.

Fig. 2. Salamander Brooch. Length ca. 4cm. Courtesy: Museum of London.

Mining of Colombian emerald deposits by the Spanish had started only in the 1560s but soon the emeralds found their way through an international network of gem merchants to both the east (India) and to the European trading centres like Seville, Lisbon, Venice, Antwerp, Amsterdam and London. Most emeralds in the hoard were cut en cabochon and those of lower qualities have been foiled.

Other gemstones encountered are rubies from Burma and India, red spinels (termed 'balas rubies' at the time, those in the Cheapside treasure may have come from both the classical deposit in Afghanistan (now Tadjikistan) and from other localities) , sapphires, iolites, chrysoberyl cat's-eyes and moonstones from Sri Lanka, almandine and hessonite garnets (the latter also from Sri Lanka), Lapis Lazuli from Afghanistan, turquoise from Persia, opals from Hungary and amethysts and citrines of unknown origin. Often cut en cabochon, the hoard also includes facetted stones, both rose-cuts and briolettes and perfectly table-cut sapphires and citrines. The question of where they have been cut has not yet been resolved as it can also not be said with certainty where the jewels have been produced. Most of the gold, tested by the Goldsmith Company's Assay Office, has a standard of 19.2 carats and corresponds to what was named the 'Paris touch' while the official standard in London at the time was 22 carats.

Fig. 3. Ruby and diamond bow pendant. Most of the channel-set, table-cut diamonds are missing. Length ca. 5cm. Courtesy: Museum of London.

All diamonds found in the hoard are table cuts (Figure 2 and Figure 3). The brilliant cut, although described by Benvenuto Cellini in 1568, was not yet used for smaller stones and all diamonds still originate from India. Other deposits had not yet been discovered.

Pearls, mainly small in size, seem to have been used as an element of decoration only, moreover many are missing. The latter may have to do with the burial of more than 300 years, as a large part of those pearls that are preserved show signs of decay. Others have survived in remarkably good conditions. This is true for the largest nearly round pearl of 11mm in a sapphire cameo pendant while the large baroque pearl of 21mm in a ship pin lacks beauty. The pearls may have come from traditional finding places in the Persian Gulf, Red Sea or the Strait of Manaar (between Ceylon and India) but they may also have come from South America where Christopher Columbus, on his third voyage in 1498, had discovered pearls in the hand of the natives at the coast of what is now Venezuela. Besides Sevilla and Venice, London was a main trading place for pearls. Cameos are worth mentioning as they include antique Roman and Byzantine

examples (made from agates, jasper, heliotrope, cornelian, lapis lazuli, amethyst and sapphire) and an agate cameo of Queen Elizabeth I. Moreover, the hoard includes foiled gemstones and fakes, for example imitations of ruby made of crackled and dyed rock crystal and red and green pastes. (Figure 4). This provides invaluable information for gemmologists while historians and goldsmiths can use the hoard as an equally invaluable source of information for jewelry styles and techniques at the turn of Tudor to Stuart London. The exhibition of 2013/2014 attracted great public attention, which showed itself by a veritable run of visitors that may make it nearly impossible to leisurely view the objects in detail.

Fig. 4 Gold pendant set with cut and polished red and green pastes (glass). Length ca. 5.6cm. Courtesy: Museum of London.

I gratefully recall a visit in 2007, organised by the Gemmological Association of Great Britain, where a small group of participants was allowed to view Cheapside objects on a table.

Acknowledgements go to Hazel Forsyth for making the photographs available.

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Catalogue: Hazel Forsyth, 2013, *The Cheapside Hoard – London's Lost Jewels.* Museum of London, Philip Wilson Publishers Ltd., 272 pages.

Interview with Branko Deljanin

Former Founding Member

Branko, what made you start your own gemological laboratory ? I started in 2009 in order to give a good service to the Canadian trade. With so many new diamond and gem treatments and so many new productions of lab-grown diamonds, the trade needs a place where it can turn to for proper identification and certification.

What is the main specialization of your work? Grading and lasering of Canadian diamonds, diamond identification including detection of treatments and artificial colouration, identification of synthetic diamonds.

What type of equipment do you use? Besides standard gemological equipment I use advanced techniques like VIS-NIR, FTIR and PL spectrometers and Sarin and OGI lasering machines.

Branko, what was your most unusual or most spectacular finding so far? An originally brownish CVD synthetic diamond that was HPHT-treated to a fancy yellow colour in order to imitate a natural coloured diamond.

Interview by Elisabeth Strack.

Publications:

- New Generation of Synthetic CVD Diamonds Reaches the Market (2014)
- Identifying Diamond Types and Synthetic Diamonds with Cross Polarized Filters (2010)
- Characterization of pink diamonds of different origin: Natural from Argyle, irradiated, HPHT treated, treated with multi-process, coated and synthetic' (2008)
- Laboratory-grown Diamonds, Information Guide to HPHT-grown and CVD-grown Diamonds ' (2007)
- A new HPHT process to modify color of natural diamonds' (2000)

Branko Deljanin is specializing in an Advanced Diamond Program that he has presented so far on all continents except Africa and in 12 countries.

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