

# Gems & Jewellery

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EMERALDS  
IN PAKISTAN

RUSSIAN  
WONDERS

LOOKING TO  
LIVERPOOL

SIGNATURE  
JEWELS

GOLD SHEEN  
SAPPHIRES



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# Shimmering Sapphires

Thanh Nhan Bui explores the beautiful and infinite optical variations in a new variety of 'Gold Sheen'™ Sapphire from Kenya.



1: Rough.

## INTRODUCTION

Mineral corundum is the crystalline phase of aluminium oxide forming ruby and sapphire. For those with an elementary knowledge of gemstones, ruby and sapphire are usually associated with red and blue colours respectively. Actually, sapphires can exhibit a large range of colours due to different impurities present in the crystal. Moreover, when foreign needle-shaped inclusions parallel to specific crystallographic directions are present in sufficient quantity, the stones display an optical effect known as asterism – when reflected light produces a 6 or 12 rayed star in cabochon cut stones. Strong shimmering effects, present for example in sunstones, are quite rare in corundum and are rarely reported in the

gemmological literature or noted on the gemstone market. Here, however, we describe a new variety of sapphire from Kenya displaying such an optical effect: the 'Gold Sheen'™ sapphire.

Already noticed by researchers before 2000, rough parcels of 'Gold Sheen'™ sapphires were brought to the gemstone market in Bangkok at the end of the last decade by African gem brokers and were offered to several gem dealers. Their overall appearance is dark and opaque, but they displayed a subtle golden shimmering effect on their basal planes (1). Its exact location in Kenya is a matter of debate in recent gemmological literature but current discussions situate on the Dusi mine, located near Garba Tula, in Isiolo county, central Kenya.

The first comprehensive study of this stone was published in *The Journal of Gemmology* in 2015, followed by further updates in gemmological journals and reports and interviews in jewellery magazines, demonstrating the great attention on this new variety of corundum. Since their launch, the gradual unpacking of rough bags and the improvement of cutting skills has brought out several varieties belonging to 'Gold Sheen'™ sapphires. Here we shall explore the features of the wide varieties in this new type of corundum.

## COLOURS AND GOLDEN SHEEN EFFECT

Two elements contribute to the colour of 'Gold Sheen'™ sapphires: the body colour of the sapphire and the golden sheen effect. The body colour can be yellow, green, blue or a combination of these three colours in different intensities and shades. Most of the sapphires display a unique and peculiar golden sheen effect, resulting from the presence of platelets and acicular inclusions identified as an exsolution of hematite and ilmenite ('sheen inclusions'), scattered in the stone matrix (2).

## TRANSPARENCY

The presence of the sheen inclusions near the surface of the gemstone creates the golden sheen effect. Of the two factors that impact the colour composition of the stone, only the sheen inclusions influence the transparency. This is directly related to the density of sheen inclusions along the c-axis of a sapphire, i.e. the thickness of the cut stone. While high density leads to a

2: Colours.



brownish sheen and an opaque stone, low density produces a fine golden sheen and a translucent stone (3). The overlap of a layer of yellow sapphire above sheen inclusions significantly enhances the golden colour. In the case of a layer of blue sapphire with sheen inclusions, a blue sheen is created (4).

### HEXAGONAL PATTERN

Colour zoning is a classical phenomenon in corundum and results in straight growth bands following crystal faces of sapphire in a hexagonal pattern. Usually, growth bands are observed as alternating colours in the body of the sapphire. Here, the exsolution, responsible for the presence of sheen inclusions, generates alternating golden sheen areas with pristine sapphire, or golden sheen areas of different densities (5). These features demonstrate the variety of impurities



present during the crystal growth of a sapphire. This gives rise to some rare and spectacular entire hexagons in the sheen area of some pieces. Fragmented roughs of 'Gold Sheen'™ sapphires, the most commonly encountered, lead to truncated hexagons with growth bands intersecting at 120°, or even only one set of parallel growth bands.

### DARK VEINS

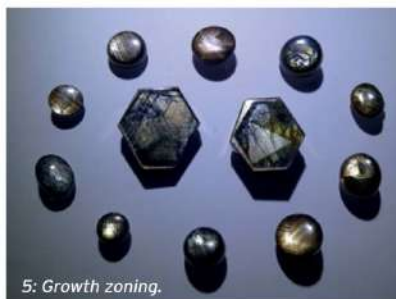
The significant density of sheen inclusions, essential to producing the golden sheen effect, induces natural cracks in the stone. These surface-reaching fractures in the sheen area are similar to random and asymmetric dark veins, generating unique patterns which add value to their beauty (6).



While high density leads to a brownish sheen and an opaque stone, low density produces a fine golden sheen and a translucent stone.

### LIGHT SOURCE

Light is crucial to illuminate stones in order to observe their colour and optical properties. The grading system of diamond is based on a daylight source, with particular specifications. Some gemstones, such as alexandrites, display a different colour in a daylight or under incandescent light. Here, the body colour of sapphire and the golden sheen effect both contribute to the overall natural optical effect of the stone. Stunning colour change occurs depending on the light source, mainly due to the presence of the sheen area. While white light or daylight can enhance the blue sheen, incandescent light strengthens the golden sheen (7a and 7b).



### CUTTING STYLE

Regardless of the cutting style, the stones are always cut so that the sheen inclusions are oriented parallel to the girdle profile, to emphasise the golden sheen effect. As like all gemstones, they are faceted or cut *en cabochon*. The average loss of weight is around 60%, depending on the rough and the required cut.

The faceted gems were cut into various common and fancy shapes. Due to the presence of the golden sheen effect in the material, there is no need to optimise the proportions of the crown and pavilion for the brilliance. Many of them were fashioned into checkerboard cuts on the front side and a flat face on the back.





7a and 7b: Showing the enhancement of the golden effect by using an incandescent light (right).

Domes of the cabochon must be slightly flat in order to optimise the golden sheen effect, but also deep if a star is being highlighted. This is a trade-off between the golden sheen effect and asterism.

Among the sheen inclusions, those having a needle shape intersect at  $60/120^\circ$  according to the crystallography of the corundum matrix. When they are present in the stone in sufficient quantities, they produce a star if the stone is cut *en cabochon*. Due to the nature of these inclusions, the star displays 6 rays, is gold and its rays are parallel to the colour zoning or growth bands (8).

Due to the uniqueness of each gemstone, the matching of pairs – or a set – is quite challenging. Pairs possessing the same pattern are possible, requiring a rough piece that is cut in two for each side. This technical produces pairs with perfect matching (9).

### SIZE

The typical sizes of 'Gold Sheen'™ sapphires range from less than a carat up to about 20 carats. A large quantity of rough is required to supply parcels of calibrated sizes (10a). Pieces weighing up to more than 300 carats are easy to find and cut (10b). While small sizes are suitable for jewellery, the largest ones constitute collector or museum pieces.

### TREATMENTS

The cutting and polishing of the rough material is currently the only process imposed on these 'Gold Sheen'™ sapphires. The stones sold in the gemstone market are natural with no indication of heat treatment. Previous experiments (unpublished) demonstrated that heat treatments do not enhance the golden sheen effect or the possible 6-rayed star. Thus, there is currently no reason to apply any treatment on 'Gold Sheen'™ sapphires. Samples have been tested in

several distinguished laboratories around the world, mentioning the rare and unique golden sheen effect displayed by the stone including: HRD Antwerp, SSEF, GRS, AIGS, GIT, Lotus, GIA and many more.

### PRICE

When 'Gold Sheen'™ sapphires first entered the gemstone market in 2014, their price was about \$10 per carat. Nowadays, thanks to reports in jewellery and gemmological literature, conferences, and sales at gems and jewellery shows, the price begins at a few tens of dollars per carat and reaches about \$750 per carat for the best quality pieces sold to wholesalers or retailers.

The price depends mostly on the golden sheen effect, the transparency, the size, the body colour of sapphire, the pattern created by the sheen area and the dark veins, and the quality of the 6-rayed star in the case of star sapphires. 'Gold Sheen'™ sapphires are valuable when the stones are highly translucent but the presence of sheen inclusions, necessary to create the golden sheen effect, decreases their transparency. This trade-off is identical to fine star gemstones. The best pieces of 'Gold Sheen'™ sapphires, showing a subtle golden sheen effect, are almost transparent. Among the unsorted rough, about 30% have a commercial value, 30% are good quality, 20% are fine and of 20% extra fine quality.

8: Stars.



9: Pair.



10a (left) and 10b (above): Large pieces.

### FINAL WARNINGS

'Gold Sheen'<sup>™</sup> sapphires is the most widespread appellation of this new variety of corundum. It has recently become a trademark owned by Tanzim Khan Malik. Some wholesalers currently present the same stone under other names, which may confuse consumers.

Due to the recent notoriety of 'Gold Sheen'<sup>™</sup> sapphires, and considering their slight similarity with black (star) or brownish sheen sapphires originating in other localities, some sellers would be tempted to associate these resembling varieties under the designation 'Gold Sheen'<sup>™</sup> sapphires for a better sale.

### CONCLUSION

Through the different features explored here, a rich variety exist in 'Gold Sheen'<sup>™</sup> sapphires due to the combination of the body colour of the sapphire, and the presence of sheen inclusions accompanied

with fluctuations during the crystal growth. These features, combined with their pattern in the corundum matrix, renders each cut piece unique. To the best of our knowledge, the only known deposit is located in Kenya and is already depleted of high quality stones. The whole stock is now based in Bangkok and will fulfil the gemstone market for the next few decades. Nature has no secret when creating 'Gold Sheen'<sup>™</sup> sapphires and the story of each composed stone tells the whims of nature. Most of them are unique pieces of art.

### ACKNOWLEDGEMENTS

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*All the figures were photographed with a daylight lamp, except figure 7b as already noted.*