



4 ColorCodex™; The first standard of gemstone color

ColorCodex™ is the colorimetric system specialized for the gemstones. It was developed by Mr. Christopher P. Smith of American Gemological Laboratories and released in 2019. The existing colorimetric systems such as Munsell were not suitable for gemstones. For example, their 2D printed color samples cannot express the vivid color of gemstones, and they are difficult to apply on 3D gemstones. On the other hand, the color sample of ColorCodex™ consists of transparent color film which can express the uniquely saturated color of gemstones. And it has reflecting background to duplicate the reflection and shadow of the facet cut gemstones. These features enable the easy application to the color of gemstones. It is the first completed system on a practical level for color of gemstones. We hope that its benefits become known more to be the international standard for the color of gemstones.

1) Existing methods to express the color of gemstones

Because of the COVID-19, it is difficult not to travel all over the world to see the gemstone products directly. Then, it became more important to express the color of gemstone correctly.

Previously, in order to express the color of gemstones, the people used a) standard color system like Munsell, b) master stone sets like the color of diamonds, c) general color name like a "sunset color" and d) trade color term for gemstones like pigeon blood.

In order to apply the color system to the gemstone, the following points must be cleared. 1) The wide color range to express the color of gems, 2) The reproducibility to express the color accurately 3) The easiness to share as the information. However, the existing methods had some problems of these.

2) Standard color system like Munsell: Easy but not cover all color of gemstones

Munsell color system is easy to apply. But because it is color sample printed on the paper, it does not cover the vivid color of gemstone, and it is difficult to apply it to the gemstone, which is 3D and faceted.



No enough chroma sample on Munsell scale for the Pigeon blood ruby

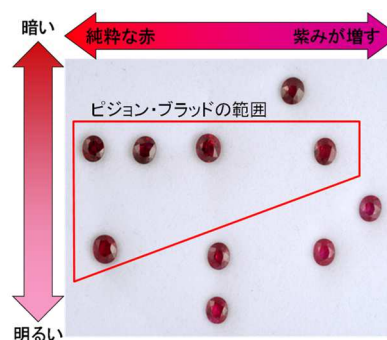
3) Master stone set: Precise but not easy to share as the information

Using the master stone set is precise and easy as they are same kind of gemstones, as it is used for the color of diamond (Colorless to near colorless, for not fancy color).



Color master stone sets of diamond

However, preparing identical samples sets for the color stone is very difficult. It is because there are many factors of the color for colored stone. The following master stone set of pigeon blood (only one classification) contains the hue and tone. Even just these 2-dimensional factors require much more sample stones than the single dimensional color of diamond. Thus, it is not proper way for sharing it as the information.



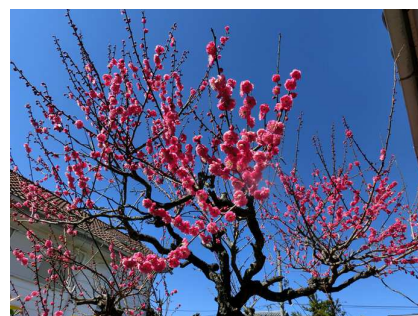
Master stone sets of Pigeon blood ruby

4) General color name: low accuracy or difficult to understand

Using general color name is simple and easy to understand. But the general color descriptions like red, purple, violet and blue are too broad to express the specific color of gemstone.

On the other hand, there are several color names in Japanese. For example, there are many variations of red such as plum blossom red, camellia red, rose red, autumn leaves red, madder red, scarlet red and rouge red. But how many of them can be understood without the detailed difference.

If the general color name is too broad, it is not accurate. And if it is too detailed, it is too difficult to understand.



The color of red plum blossom as an example of Japanese color expression from the nature

5) Trade color code: Narrow range of color and low accuracy

The trade color term is specialized for top quality gemstone. It expresses the specialty of them, but the interpretation of them varies a lot because it is a culture born in the gemstone locality and not a codified definition. Also, it is only for a specific gemstone, and sometimes, it is only for one locality gemstone.

Thus, it is not so accurate and also it can express only a narrow range of color.

6) Difficulty of applying on the gemstones

The facet cut of gemstone makes it even more difficult. The color of faceted gemstone is like a mosaic of reflection of light and shadow.



Ruby with a high luster (L) and ruby with a window (R)

7) ColorCodex™ overcame these difficulties by specializing only for gemstones

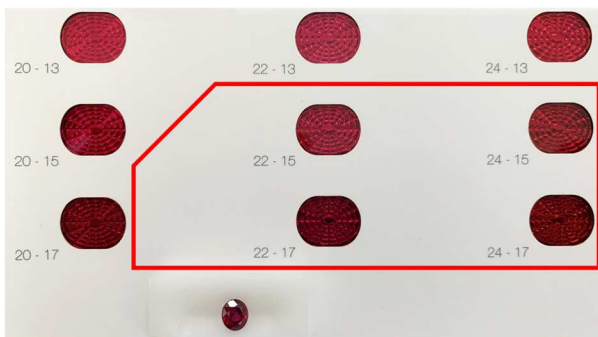
The features of ColorCodex™ are 1) Easy to use, 2) Wide range of color including super saturated ones, 3) Emulating facet cut like a virtual facet.

ColorCodex™ consists of so many color samples of 65 hues. (Normal Munsell consists of 20 hues) The Hue is most important element in colored stone. A difference of one grade of hue changes its value a lot.



Color samples of ColorCodex™ (one of the 13 sheets of various hue)

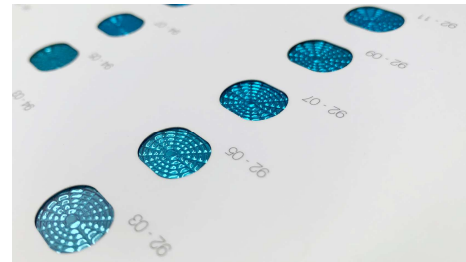
The color sample of ColorCodex™ is not a printed matter. Its color windows are made of colored transparent film. It enabled to express the highly saturated color (like pigeon blood ruby) which is impossible with CMYK ink.



Pigeon blood ruby and its JGGL criteria in ColorCodex™

Moreover, the color sample of ColorCodex™ has a special mechanism to emulate the lighting and shadowing of the

facets. They have engraved foil back under the color film. It reflects and shadowing the light like facet cut gemstones. It makes much easier to compare with gemstone than other color samples like printed one of Munsell.



The color window system of ColorCodex™

8) Things possible with ColorCodex™

It is simple and easy to apply ColorCodex™ to the real gemstones. It can clear the following troubles we face today.

It reduces the risk of remote trading. If we take the picture of the gemstone on the matching ColorCodex™ sample, it can eliminate the misleading by special photo shooting. It helps the remote trading under the COVID-19.

More secure quality control of the color The tiny color difference is important for some gemstone, like padparadscha sapphire. The sorting based on the color becomes much more precise with ColorCodex™.

No need to train the new stuff for color sorting Each dealer has the own criteria for their products. But such criteria can be expressed with ColorCodex™ simply. If it is done, then there is no need to train the new stuff to follow their criteria. Also, it may be the best color dictionary for the student of gemology.

Avoid too much dependance on gem report There are too many reports with pigeon blood or royal blue comment in the market now. And their key feature is the color. For such ruby and sapphire, the comparison with ColorCodex make it more confident to check their color, than just showing such reports. Also, it may enable to find out the subtle difference of the color in the pigeon blood such as relatively lighter red or even more deep red, more than just vivid red of pigeon blood.

These may reduce the too much reliance on the gem report and dealers can be more confident on their own products.

9) Little issues of ColorCodex™

Some gemstones are not suitable with ColorCodex™. For example, the opaque gemstones like turquoise is not good with it. But for such opaque stones, the texture of it is more important than color in many cases. And, sometimes the pastel colored gemstone does not have the matching samples in it. We felt it in checking Padparadscha sapphire. Also, the price of US\$2,000 is not easy to buy like a regular book, but this price is like as encyclopedia for the life time value.

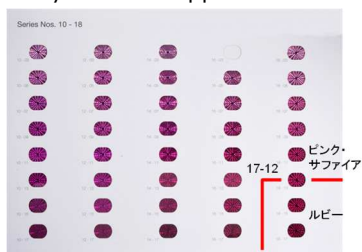
10) The possibility of ColorCodex™

As we mentioned before, ColorCodex™ is the first practical color samples for gemstone. We hope it will be the world-wide standard of the color of gemstones.

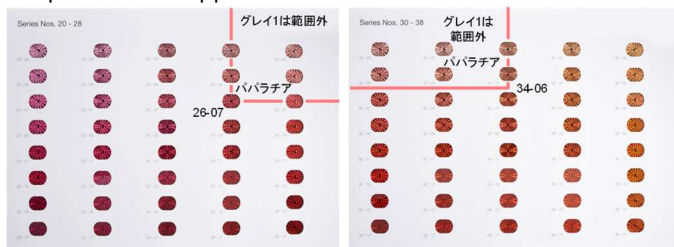
Some guideline

※JGGL standard

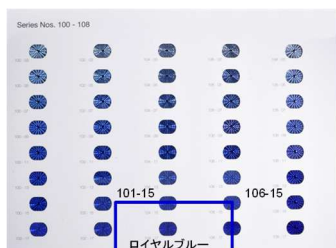
Ruby vs Pink sapphire



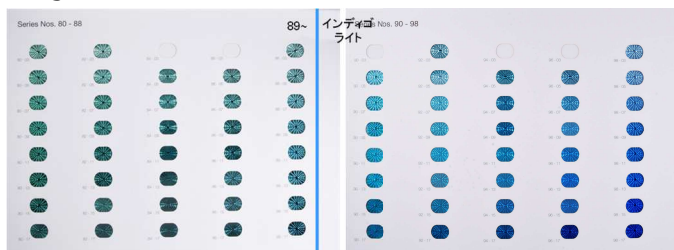
Padparadscha sapphire



Royal blue sapphire



Indigolite tourmaline



Paraiba tourmaline (yellow side broader)



The pure color in Munsell and ColorCodex
(JIS based: Japan industrial standard)

色	紫	青	緑	黄色	橙	赤	赤紫
マンセルの色相	0.3RP	10B	2.5G	4Y	5YR	5R	5RP
ColorCodex	136	96	70	50	42	28	14