

## New Paraiba-type tourmaline from Mozambique

GIT Gem Testing Laboratory (GIT-GTL)  
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In September 2010, GIT-GTL received a number of blue to greenish blue stones claimed to be “Paraiba” tourmaline from new mine in Mozambique. The so-called “Paraiba” tourmaline was originally come from mines in Batalha area, Paraiba Region of Brazil. Later on, the similar materials were found in Nigeria and Mozambique respectively. As a result, the LMHC members was earlier agreed to call the “Paraiba” tourmaline as a new variety of elbaite tourmaline which is colored by copper and manganese regardless of where they come from. It is one of the rarest variety of elbaite tourmaline. In the last few years, the Paraiba-type tourmaline from Mozambique has played a major role in the market due to its large quantity of production and wide range of quality available. The low temperature heat-treatment is usually employed on this material in order to remove purplish tint from the stone before sale.

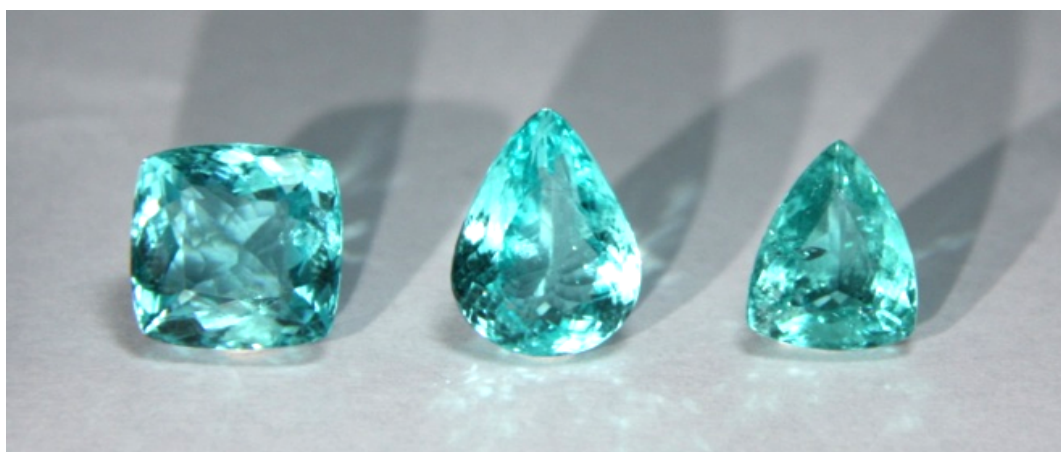


Figure 1. Three Paraiba-type tourmalines from a new mine in Mozambique ( 6.48 ct, 5.34 ct and 5.11 ct). *Photo by Warinthip K.*

Since we have received the Paraiba-type tourmaline claimed to be from a new mine in Mozambique to the Lab, the first impression when we observed these new gemstones was the color of these new stones obviously deeper and more intense than the materials from the previous localities in Mozambique (see Figure 1). According to the client, the new mine was located not far from Nampula in Mozambique (previous one). However, the exact location is still not clear. The general investigations by basic gem testing instruments indicate that these stones are tourmaline. The inclusions show many tension cracks extended from fluid inclusions and tubes which suggest that these stones were heat-treated.

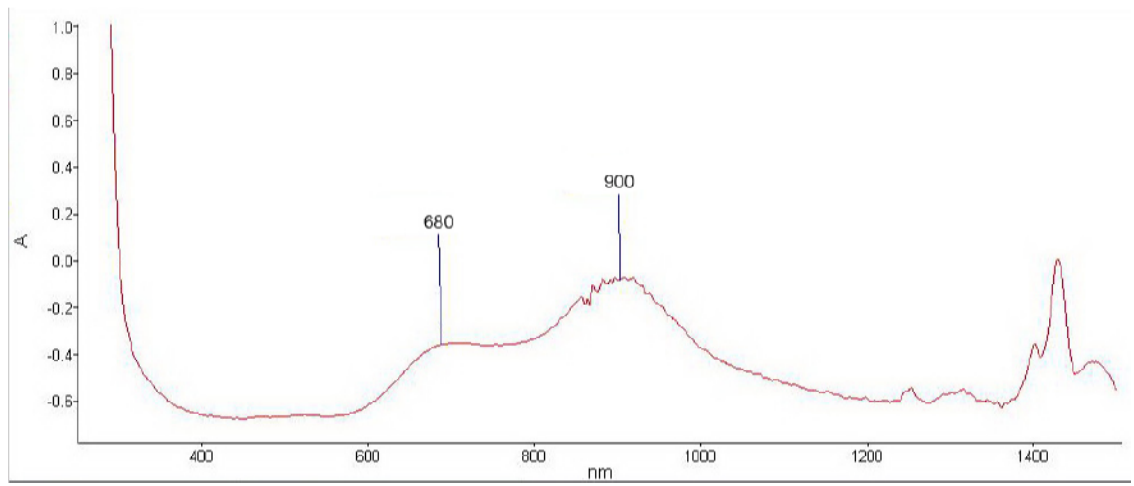


Figure 2. Representative UV-Vis-NIR spectra of Tourmaline from new mine shows Cu-absorption around 600-1000 nm.

The UV-Vis-NIR spectrum show clearly broad absorption at 680 nm and 900 nm ( see Figure 2) which is interpreted to be the absorption due to copper and this pattern is perfectly match with the spectra of Paraiba-type tourmaline from Brazil and other localities.

Nonetheless, it is notwithstanding that the chemical analyses of those stones by EDXRF show rather high calcium (Ca) content as compared with the Paraiba-type tourmaline from the previous mines (see comparison in Figure 3) as well as with other elbaite tourmaline.

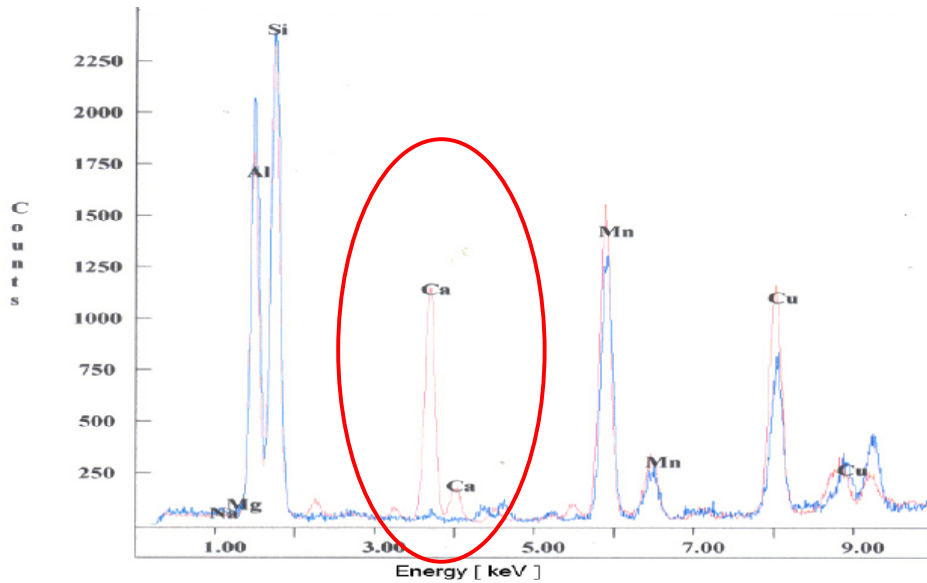


Figure 3. Comparison of the EDXRF spectra of a Mozambique Paraiba-type tourmaline of the elbaite member from previous mine (blue line) and a material from new mine (red line) containing high Ca indicating the liddicoatite end member of liddicoatite-elbaite tourmaline solid solution series.

Because of the high content of calcium in most of these stones, it is mineralogically be called a liddicoatite (Ca-tourmaline type) rather than an elbaite tourmaline (Na-tourmaline type) as previously defined for Paraiba-type tourmaline. The liddicoatite-elbaite tourmaline can occur as a solid solution series, i.e., containing both Ca and/or Na, and it seems to be impossible to differentiate this new material from others without sophisticate chemical analysis technique. This finding is the world first discovery of this type of Cu- bearing liddicoatite tourmaline which has its color falls in the range of blue, bluish green of the Paraiba-type tormaline.

For this reason, to avoid any confusion in the gem trade, LMHC members have later agreed to give the definition of Paraiba-type tourmaline to cover the whole range of liddicoatite-elbaite tourmaline solid solution, where its color is caused by copper (Cu) and manganese (Mn) to be accepted as a new variety of the so-called "Paraiba" tourmaline.

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