

## GLGemSpec News August 2010

We have sold and delivered the first 10 units of the GL Gem Spectrometer system and all users reported easy setup and good initial results. We expect the next batch of spectrometers to be ready for early September and hope to sell 20 to 30 additional units this year.

Unfortunately the introductory price will expire by August 30 and the regular price will be slightly higher. However, we will keep the price for the complete system including the fiber, halogen light holder and software under \$ 2,000.

### Quick Review of "How To Get Started"

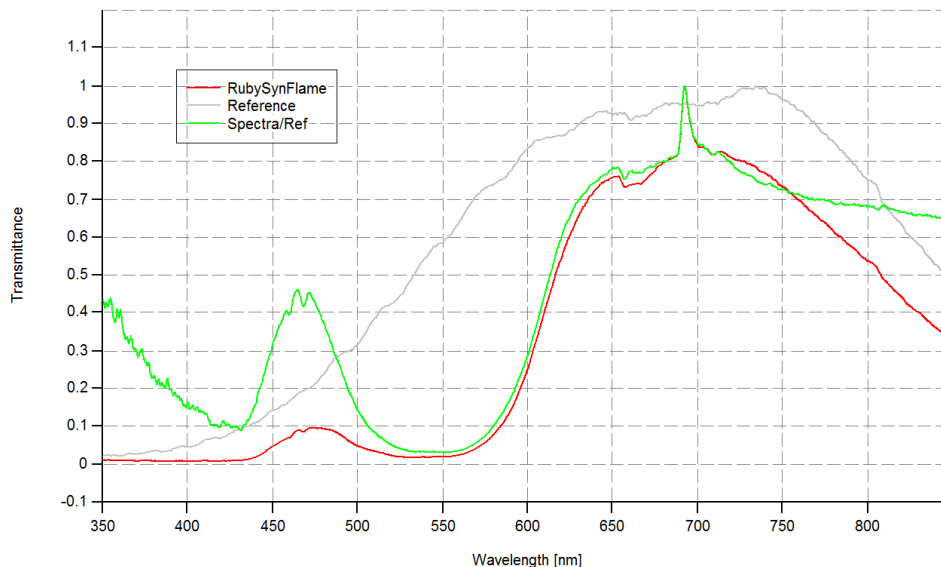
Please read carefully the revised "How To Get Started" manual.

A BoxCar=5 will give enough smoothing, and the initial Exposure (Integration) time of 11.9 ms is sufficient for the average stone. If the stone is larger or darker increase to 20 - 50 ms. The number of scans stabilizes the curve (up to 4 or 5 but waiting time increases).

If you wish to process the spectrum in Spekwin32 the "raw" spectrum must be saved. When naming a spectrum the program adds automatically .fak to the file name.

It is recommended to include in the file name as much info as possible to allow another person identify the spectrum. For example start with the name or abbreviation of the gemstone's name: Rub, Saph, Gar, Tourm, etc. followed by Syn, Comp and followed by the colour or other identifier. SpinSynBlue = synthetic blue spinel; EmeraldSynGilson = synthetic Gilson emerald.

You can save a "reference spectrum" [Get source spectra] and name it "Reference"; it saves as Reference.fak and when opened in Spekwin 32 the typical bell shaped curve of the halogen emission spectrum is seen.

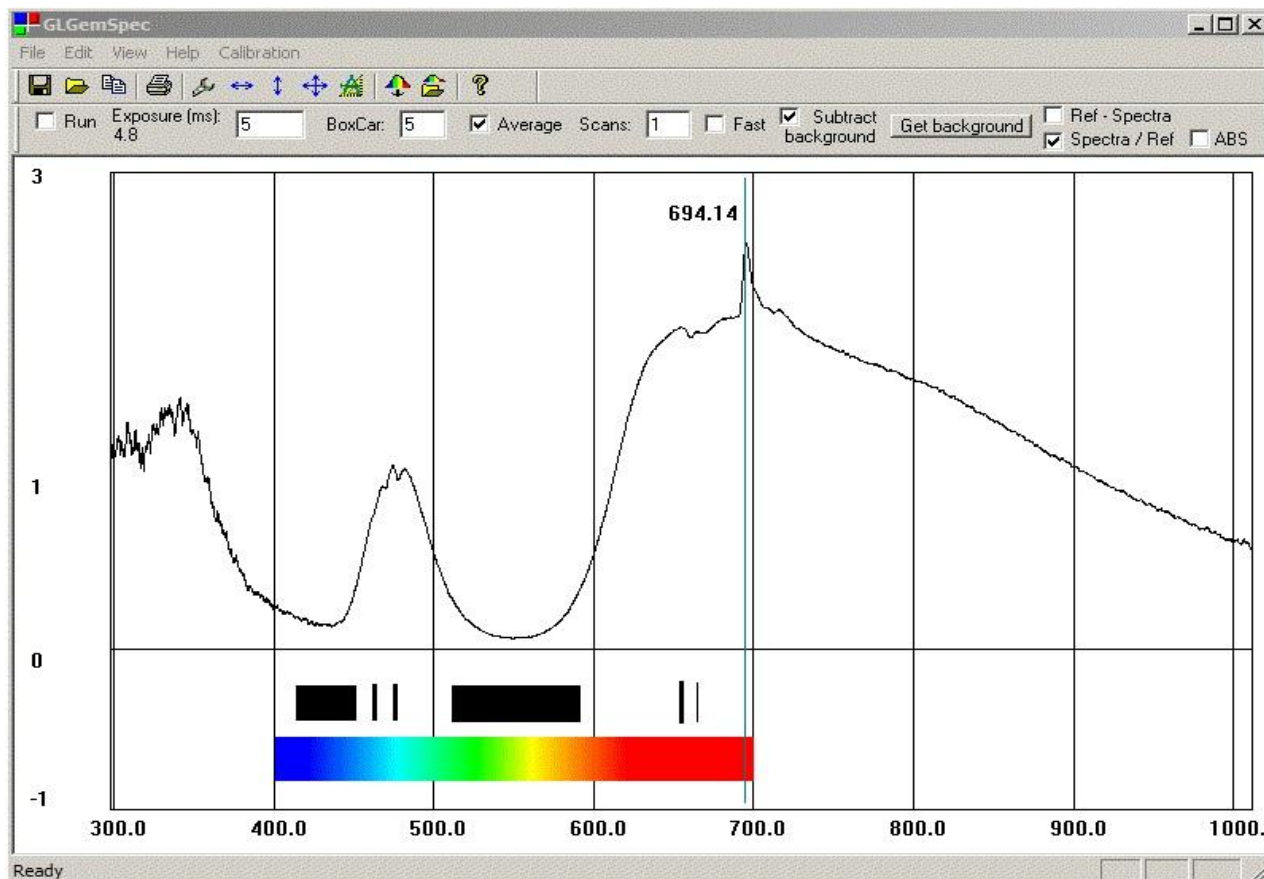


The intensity level in the halogen bulb decreases dramatically towards the red and violet end of the spectrum. This is the reason the box Spectra/Ref has to be clicked to make a "proportional" lamp correction; in simple words the lower intensities will affect the spectrum less than the intensities at its apex. The spectrum will change in certain parts.

For an absorption spectrum click "A" (absorbance) - new in GLGemSpec version 2.00. You may click the box "Ref - Spec" to subtract the spectrum from the reference (the lamp file). These calculations can be quickly done in Spekwin 32; just open the "raw" spectrum RubySynFlame.fak file with transmittance as Y axis. Then open Reference.fak and click normalize ; now click on "D" to make a Division: RubySynFlame/Reference and the same graph is seen as in GLGemSpec now fit in between 0 and 1.0 for the Y axis.

### Discussion of Synthetic Flame Fusion Ruby

The slightly purplish red stone was positioned table down. First a "dark spectrum" [Get background] while lamp was switched off was taken and [subtract background]. The light was turned back on and the "raw" spectrum appeared. Next the stone was removed and a "reference spectrum" [Get source spectra] taken. Then box Spectra/ref was clicked and it resulted in the following graph.



When analyzing a transmission spectrum we are looking for "bumps and dips" indicating low or high transmittance which corresponds to high and low absorbance. A dip (indicated in the graph by the black bands or lines) would be equivalent to absorption bands and lines seen in a hand-spectroscope. A sudden peak like the one at 693.44 nm is usually caused by fluorescence and seen as an emission line in the spectroscope. The

“noise” developing below 400 nm is caused by UV protection of the halogen bulb (see below).

Experienced gemmologists recognize characteristic spectra quickly; it is a good idea to use John Harris’s excellent spectra database at <http://www.gemlab.co.uk/Spectra%20Database.html> for reference.

## **Software Development**

GLGemSpec Program: Version 1.02 has been uploaded today; it fixes a problem with saving the Spectra/Ref file properly. A new version 2.00 will include a logarithmic conversion module to display the spectra in A mode (absorption mode). Initially I was hesitant to include this because I wanted the users to train their eye on transmission spectra and how to interpret the dips and peaks. But it may provide additional information as to how the halogen light affects the sample.

Spekwin 32 Program: Thanks to John Harris we became aware of a possible software problem. His critical eye detected a shift of the fluorescence peak of the synthetic ruby in a graph and article published in the GANZ newsletter by Graeme Peterson. First we had to make sure that our software was working properly and then I contacted Dr. Menges and asked for help. He quickly realized that the .fak was incorrectly read into his program and within 24 hours we had an update to Spekwin 32 with a number of improvements. Please download the new version because it will be our software of choice as it does all the things needed to neatly publish spectra, including saving to image files and Excel which will probably be used for development of the GLGemSpec database.

## **Accessories**

Halogen Lamp: You may have noticed that the spectral line below 400 nm is "noisy" due to the UV protection required by law for bulbs sold in North America; also they must not shatter. However, we found a Chinese supplier who sells genuine quartz halogen bulbs for less than the \$ 58 Ocean Optics charges. If we can get them for \$ 10 or less I will mail one free to all present users.

Polarizing Filter: It is possible to insert a polarizing wedge into the light path. John Harris has included information for the o and e-rays for some gemstones in his spectra database. However, the stone can only be rotated and not turned around unless a different setup using the fiber is used.

**Please Note:** I will be away from August 16 to September 8 visiting Diamantina and attending the Gem Fair in Teofilo Otoni, Minas Gerais, Brazil

Wolf Kuehn