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## **ISG: Microscopes Part 3**

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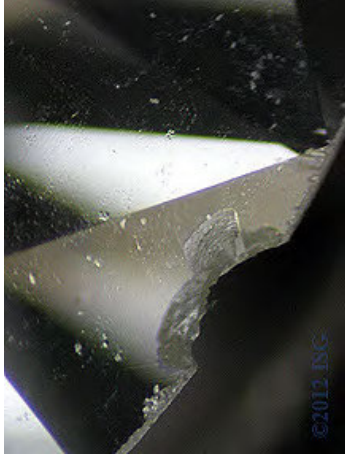
## **Microscopes Part 3**

Ninety percent of the quality of a microscope depends 100% on the quality of the gemologist using it. One can own the most expensive microscope on the market and fail to get accurate observations if the gemologist is not properly trained. However, the higher the quality of optics and available lighting the gemologist has, the better the opportunity they have at getting the best observational results. And very important to obtaining accurate observational results is the ability to photograph and document those results for presentation to others, such as the image of the color infused tourmaline in the banner above...first produced by ISG research. This requires not only the ability to properly

operate a microscope, and to identify features being presented by those observations, but also to be able to provide photographic documentation of the observations. This is important for two reasons.

### **Reasons for Microscope Photography**

1. The ability to demonstrate to a wider audience the observations done by a single gemologist, and
2. The ability to permanently document observations that may be difficult to duplicate due to unique lighting conditions required, limited availability of the specimen and other issues that may affect the ability to view the features at any time in the future.



An example of #2 can be seen at left. This was a potential litigation case in Austin, Texas where a special meeting was held for one party to inspect the claimed damage from a second party. The location was such that I had to travel 2 hours by car to the location in another city, and the timing was such that my observations had to be completed within a brief time frame in a lawyer's office with the litigants and lawyers from both sides waiting.

This not only required an efficient observation method, it also required that whatever I observed during this short time span had to be documented to a legal standing as the case appeared destined for a court room. As a result, it was required that I be able to observe accurately and quickly, and that I be able to document my observations to legal standards as the opportunity to duplicate my findings might not be readily available at any particular later date.

In other words, I needed to get good pictures of the damaged diamond during my short time in the lawyer's office in case the situation went to trial. This was easier than most people think and I will show you how....

It may surprise many to know that 90% of the images used in the ISG course notes, newsletters and other publications are taken using a 5 year old Canon Powershot A520

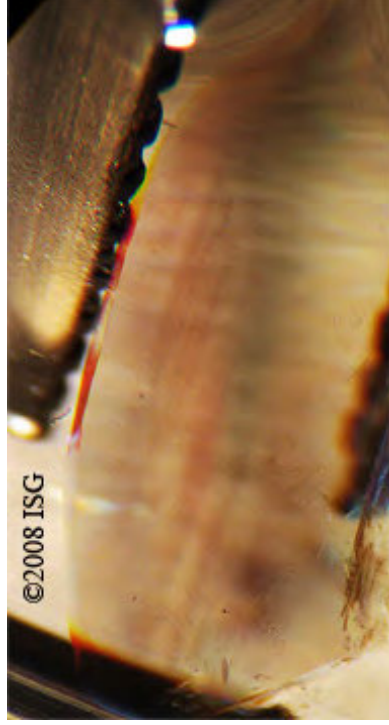
camera.



It may also surprise many to know that I do not use fancy camera holders or attachments. No expensive adapters or connectors. Just hold the camera up to the eye piece and look in the view screen and shoot a picture.

You can see this in the image at left. Just hold the camera up to the microscope eye piece and click away. Many, many times do you click away. Far too many people try to get that one great shot. They set up and try to take the ultimate

picture. That will never happen. You have to take a lot of photographs and then look at them later to see which one is the best. On average, I take 100 pictures for each one you see published here. So when you do use your point and shoot camera, don't go for that one "money shot" as it will never happen. This is the digital age, you can take as many as you want and just delete what you do not use. So take scores....hundreds if you have to. That is one of the most important tricks of the trade to getting good microscope pictures.



An example of this is seen at left. This was the first microphotograph we published of the red/green color combination of diffusion treated Tibet andesine. This shot was taken on the first day of the first specimen that I was asked to inspect to verify some method of identifying the treatment. This image was one of about 125 that I took of this specimen. The results I did not find

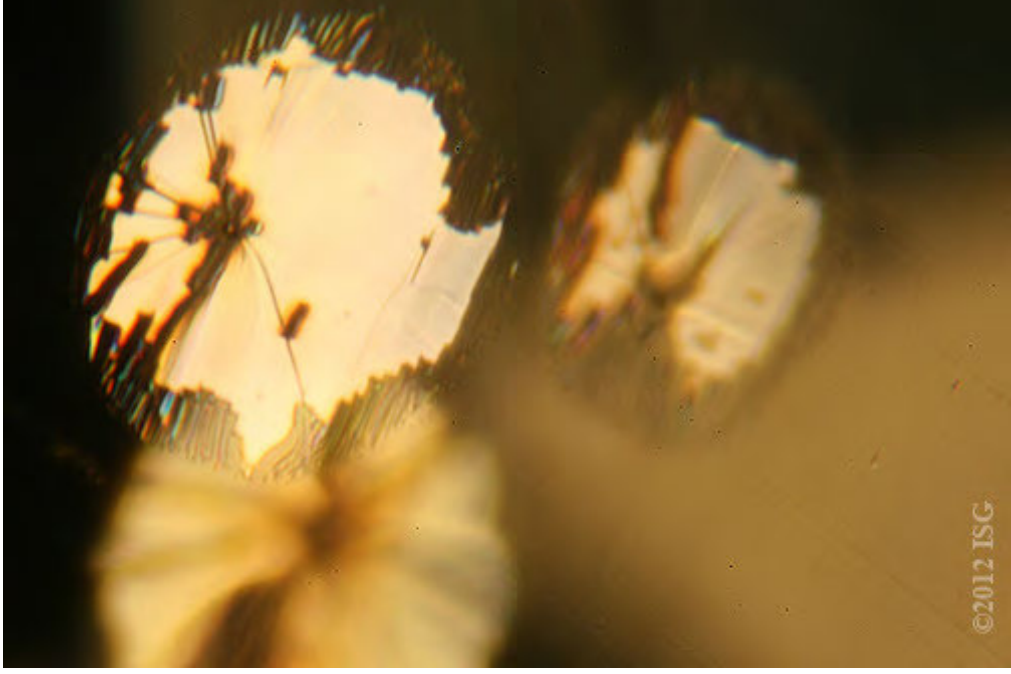
until I reviewed all of the images later. But it was the first microphotograph of the heart of this whole multi-million dollar Tibet andesine fraud. While many others before me had uncovered the situation, this was the first actual microphotograph that provided verification

of the treatment results inside the stones. (With respects to Masaki Furuya of the JGGL who had first documented the steps of the treatment process. These can be seen in the report by Gary Kratochvil: [The Great Andesine Scam](#) that first published the facts of the Tibet andesine fraud.)



Of course, it's always good to be able to use the Canon XTi DSLR camera with eyepiece attachments for the really high magnification and high resolution images. The quality of the resulting image is always the finest possible. Our original set up on our 24 year old Meiji Techno microscope used to further document the Tibet andesine fraud is seen at left.

Below you see a beautiful image of lily pad inclusions in peridot that were possible using this set up. By using a wireless digital controller that allowed for non-touch shutter clicks, the timed exposure provided an image that was possible only by the use of this set up.



And of course, for better internal imaging there is always that darned Dixie Cup immersion cell that has become so infamous. Why a Dixie Cup? Well, they don't have any special optical abilities. And they have no magical powers to do gemology. And believe it or not, the purpose is not to give a certain "Rock Star" gemologist more fodder for his blog rants. No...these are not the case. Here is the short version of the Dixie cup immersion cell....

When I first received the first specimens of Tibet andesine from Lisa Brooks-Pike, she and several others had already provided so much information regarding the possible diffusion treatment that I knew the results would be verifiable if we could get a clear enough view inside the stones. When the specimens arrived I realized we needed an immersion cell which we did not have at the time, at least not an expensive model from one of the big gem lab equipment stores. So.....on my desk I had an empty Dixie cup that was about to hold 8 ounces of Coca –Cola for my lunch. Rather than use it for lunch I cut out the bottom third, filled it with tap water, and put the Tibet andesine from Lisa in the bottom and placed it on the microscope base. The rest is history, as they say. You can see the set up below. But the Dixie cup became an icon for the fact....and I say fact in all seriousness.....you don't need an expensive immersion cell to do quality gemology. What you need is training and practice. But if it riles the "Rock Star" gemologist that I continue to tout the benefits of low priced equipment such as my Dixie cup immersion cell, then all the better for that too. Here is the set up that for the first time photographically documented the Tibet andesine fraud on a microscopic level.



And always use an **external fiber optic light**. This is required to get enough light control and intensity to do serious gemology. Microscopes that come with their own self-contained fiber optic light are basically useless. The fiber optic splits the available light down and does not offer a bright enough light source. They look impressive....but the microscopes with self-contained fiber optic lights are essentially for show and tell, and not serious gemology. They dilute the available light from the microscope dark field well down to levels that are too low to be of any real benefit. Don't go for what looks fancy on the showcase, go with what works best for gemology. Use a separate fiber optic light source that you can control independently.

Below are three images of what was seen in that first group of specimens observed during April of 2008. The loss of green color when the green stone was broken with a hammer, and the red color concentrations along the facet junctions seen on triangular cut stones, and the red/green image you saw above were all "tells" that some kind of color treatment had been done on the Tibet andesine. These images were all taken with the Canon Powershot, holding it by hand up to the eyepiece, and taking pictures with the Dixie cup immersion cell sitting on the base of our 24 year old Meiji Techno. But there is more to consider and work with on this topic.....



Another issue you will want to be aware of is **field of vision**. There is no way around the fact that one of the quality features of the more expensive microscopes is the wider field of vision. As you can see in this demonstration below, the width of the field of vision will

directly impact the size of the available image you can photograph. The images below are a demonstration only and not an actual microscope field of vision image comparison, but are used to demonstrate the potential difference in the width of the viewable field of the image. This is simply something to work with based on the field of vision of your own microscope. Practice, practice, practice is the way to overcome a limited field of vision.

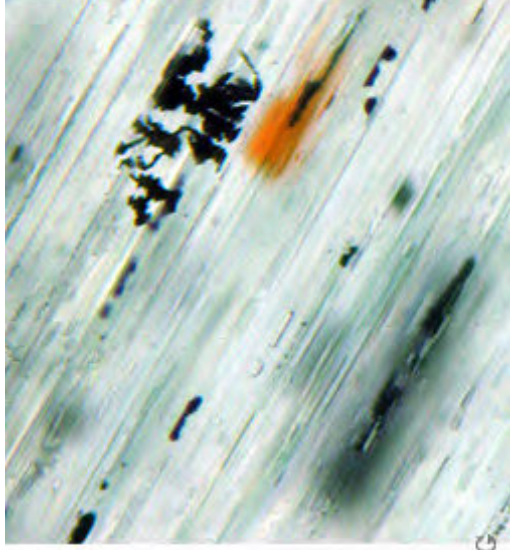


Another factor is **turret –v- zoom**. We most often use turret type microscopes here because it sets uniform standards for all of our microphotographs. With any shot we know the magnification based on the fact that we use turret design magnification stages. All of our images are 10x,20x,30x, 60x or 90x and beyond using digital enhancement. With the zoom there is no standardized measurement for imaging without time cost due to having to document that zoom magnification. By using turret design we save time and standardize our images. This is strictly a matter that is up to the individual and based on your needs.



You will see both in the ISG office, but images requiring legal documentation use turret style microscopes for the above reasons.

To further demonstrate that the quality of the microscope is based largely on the training of the one using it, we are going to take the lowest cost microscope in the ISG office and take a couple of images. The microscope we used is seen below left. It's the model we provide in our ISG Gem Equipment package for our students. Below right is an image taken using this microscope of a 5.34 carat aquamarine we recently received from one of our friends in Thailand. As you can see, the 30x magnification turret optics took a great shot of the ilmenite inclusion in this stone. And remember, nothing more was used than the student microscope you see below left and holding a hand held digital camera up to the eyepiece.



The most profound point of all of this is that you can also use the Dixie cup immersion cell to do the same level of gemology that was done in the ISG office when we documented the Tibet andesine diffusion.

To prove this point we will use our student microscope, a Dixie cup immersion cell, and our hand held 5 year old Canon Powershot A520. The microscope and Dixie cups are seen below left and center below.

Below right you see two specimens from the Hughes/Schorr Tibet Andesine Expedition. I obtained these directly from the Hughes/Schorr discussion panel at Tucson last year. These images were taken last week using the set up you see below. You can clearly see the same green/red color formations that are unlike anything natural as seen in the Oregon Sunstone. More importantly we were able to document that the red colors of the copper do not follow the original crystal structure, but instead follow the smoothed-out surface patterns of these worn down pebbles. The color formation demonstrates that the colors were diffused into these stones **after** they were already worn down.....not during crystal formation or even shortly afterward. The only way that these specimens could have this type of color pattern is if they were color diffused **after they were worn down** and smoothed out. This means one of two things:

1. The stones were naturally diffused with copper during their alluvial trip to, or after they arrived on, the Tibetan plain. But unfortunately copper diffusion while a stone washes down a river is highly unlikely, and the dirt on the Tibet plain would need to be very high in copper content for diffusion to happen after it arrived. Or,
2. The stones were diffused artificially as worn down pebbles and placed on the plain as salted material. Which is what the National Gem Testing Center of China determined most likely happened. Read their report here: [Hughes Tibet Andesine Expedition](#).  
**The images shown below, taken with our student microscope, further support the NGTC findings.**



The important issue is that we were able to further document the diffused condition of these Hughes/Schorr specimens using nothing more than the least expensive microscope, camera and immersion cell on the market....a cut-out Dixie cup. And you can do the same with some practice, practice, practice.

## Summation

There are no magic boxes for gemstone identification. The best and most successful gemologists out there use the most basic of equipment. Efforts to make you believe that you cannot do quality gemology without expensive equipment are a sales ploy, a hype, a schtick of the expensive equipment sellers. But it takes practice.

Gem identification can never be made easy. Maybe 30 years ago it could, but not today. You are not going to become a great gemologist out of anyone's textbook, course or seminar. Certainly these all help, but they are all portals and not destinations into the study of gemology. In truth, you are going to become a great gemologist by using the tools you have at hand and practice with them with as many different known specimens as you can

find until you know them by heart and understand the intimate details of each gemstone.

We did not uncover the Tibet andesine fraud based on expensive equipment. Had that been the requirement the Tibet andesine fraud would still be going strong, and the folks at Andegem and Jewelry Television would probably have all been retired by now.

No, we used a lot of sharing among the grass roots level of this industry, basic gemological equipment that we had available, and years of study and experience to understand when we see something that just does not look right. That takes us back to the Old Geezer Rule, doesn't it? Absolutely.

Old Geezers can use inexpensive equipment to do great gemology.

No matter what age you are, no matter how long you have been in this business; no matter how much you have invested in your gemological equipment.....strive to become an Old Geezer in gemology.

Practice, practice, practice.

**You don't have to apologize to anyone for that inexpensive microscope you are using. No matter what level it is, it is still half of the most powerful tool combination in this industry....you and your microscope!**



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If you have problems viewing the images you can read this article in its entirety at the ISG Student Forums here: [ISG Microscopes Part 3](#)

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