

## EPI-ILLUMINATION: DARKFIELD

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### Introduction:

[Last month](#) I presented an article about epi-illumination; using a pair of LEDs held by a circle of elastic that can be mounted or dismounted from the objectives without damaging them. I presented too the possibility of doing a kind of brightfield by adding a yellow or a white piece of paper to the slide that can serve as the background for the sample; all of this showed promising results.

Today I want to continue with the use of epi-illumination but this time I am going to present a form of darkfield epi-illumination; I followed the same principle as in the case of brightfield where I covered the slide but now with a black background, see below.

### Development:

To achieve darkfield illumination the technique is similar to the one I use to create my epi-illumination brightfield by covering the slides with a piece of yellow or white paper. But this time I used the best black background found which were six pieces of the film used to polarized the windows of cars. This was the best option tried because at least six small pieces used together produced a very dark background with the advantage over the other kinds of material tried that it looks as if you were using glass. (I tried black fabric, foam, cardboard and plastic; all of them worked but the problem is that with some you have a kind of grayish background, or you could see the texture or the background together with the texture of the sample.)



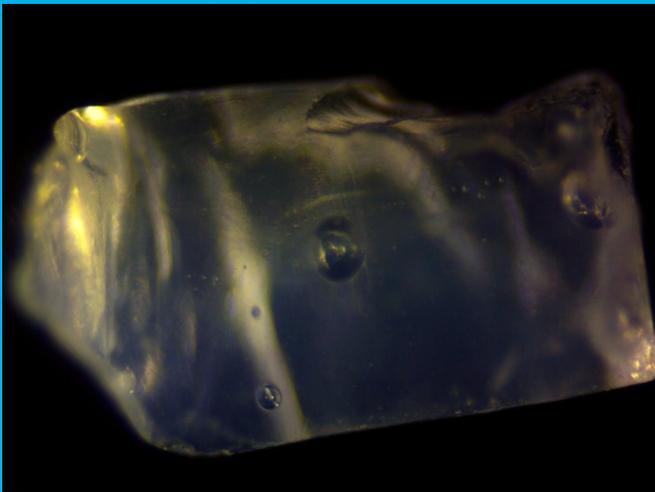
This form of darkfield is based upon the fact that in general when you have a black background the objects upon it are easier to identify than if they were seen upon a white or a brilliant background. Let's take as an example the dust upon a screen that has been removed, the fingerprints upon a dark surface, etc.

In this case the sample is placed upon the slide covered with the film then turn on the epi-illumination system. That's all you need, the sample illuminated from above is seen suspended on a dark background. The technique works better if the thick object is colored because the dark background enhances the color.

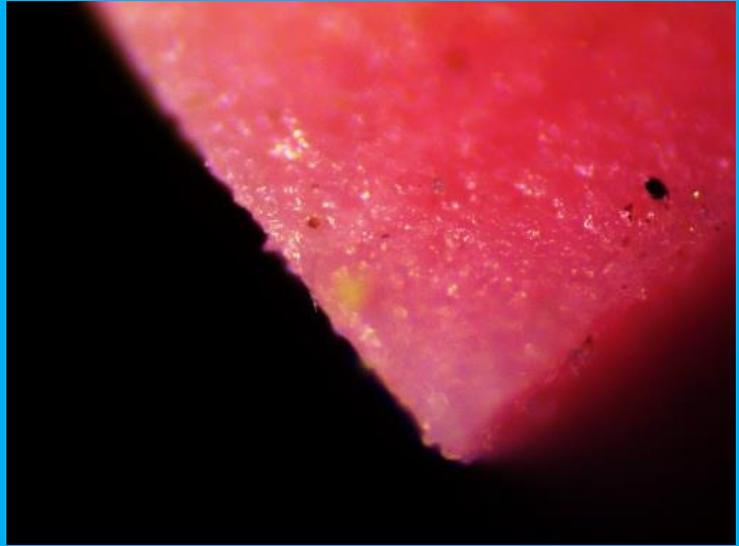
Below is the setup showing the object illuminated with my epi-illumination system upon a dark field:



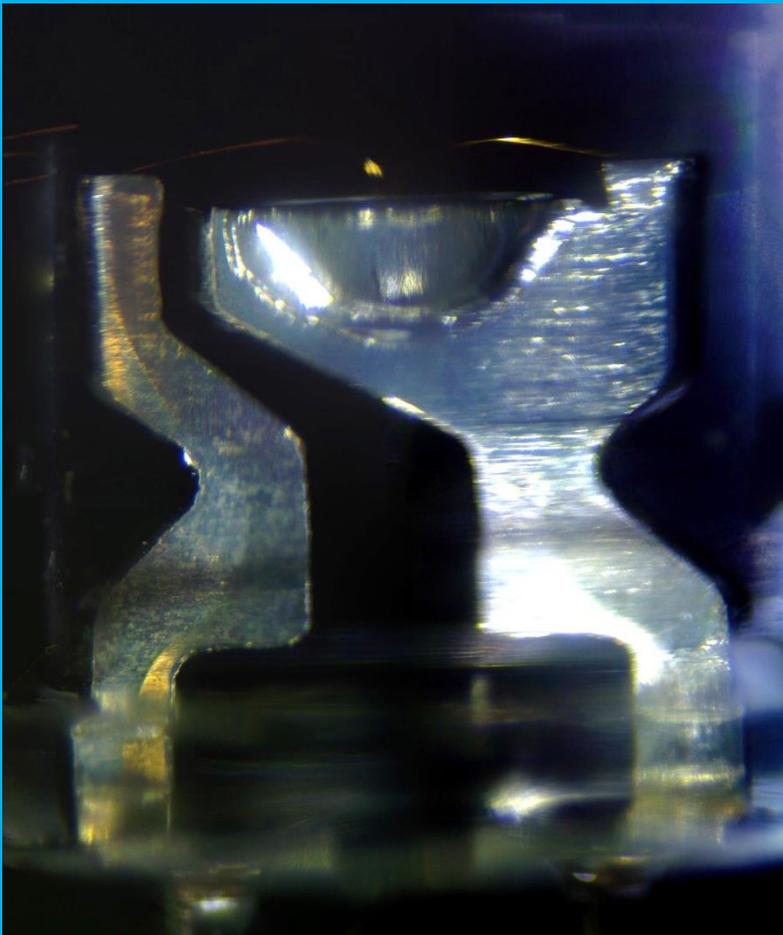
**Results:**



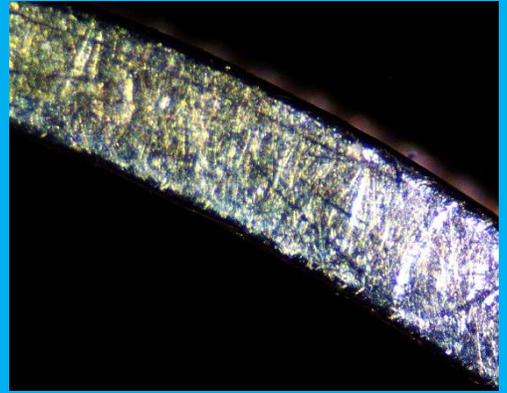
Desiccant silica gel particle 4x



A bit of a pencil eraser 10 x.



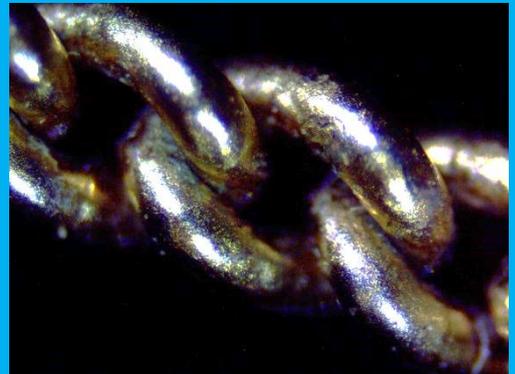
The poles of an LED 4x



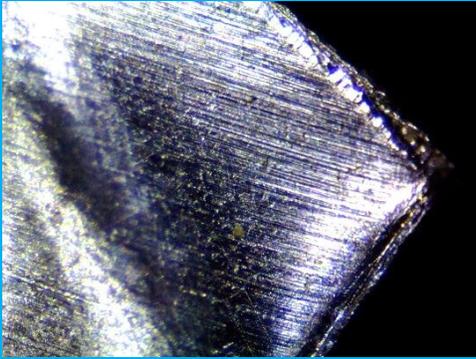
Part of my wedding ring 4 x



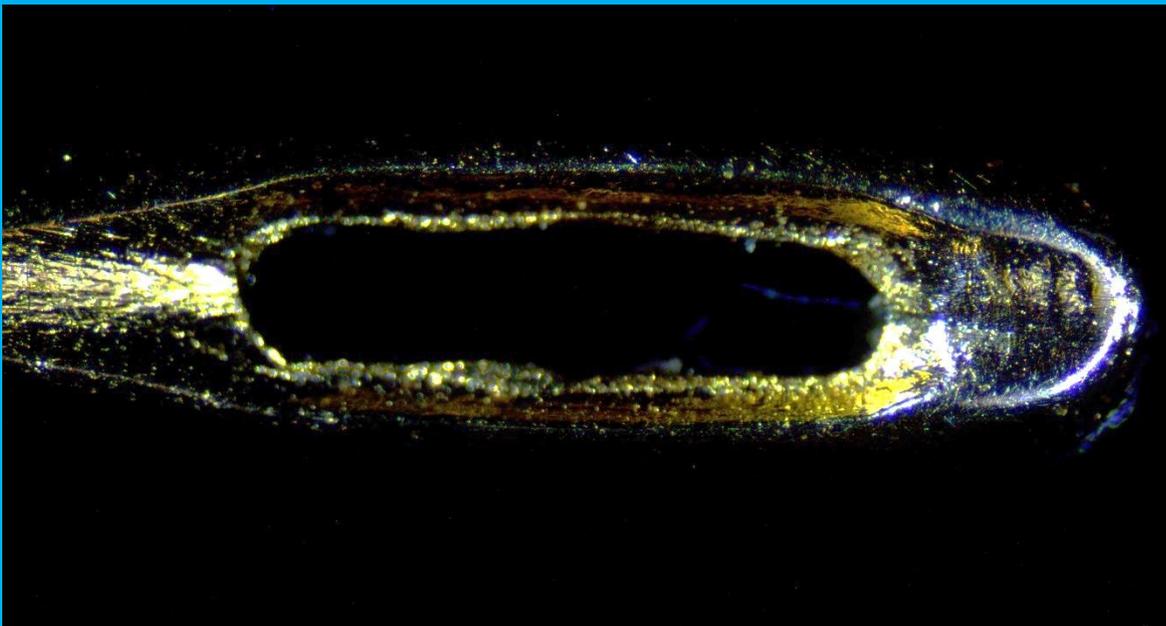
Some sealant tape 10x



A necklace chain 4x



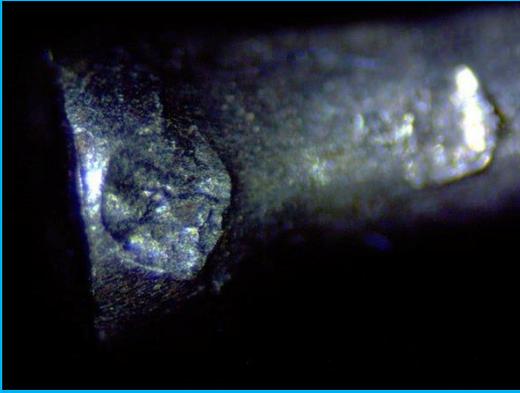
A bit of aluminum cover of an injectable medication 4x



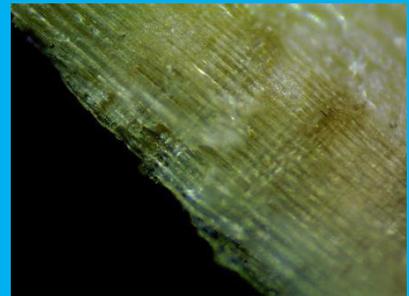
The eye of a needle 4x



The tip of a nail 4x



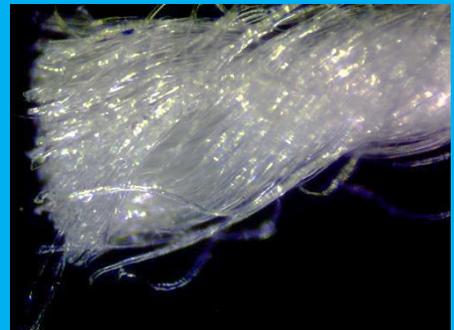
The head of a nail 4x



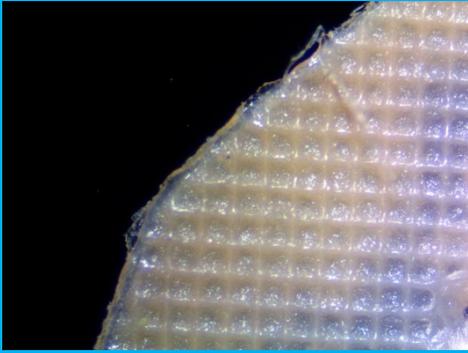
A bit of pine tree wood 4x



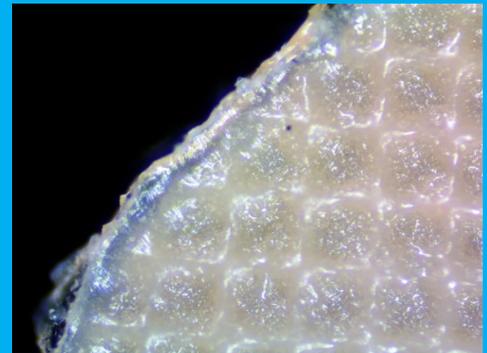
A bit of copper wire 4x



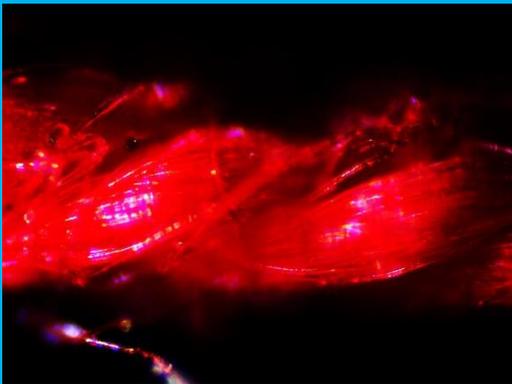
A bit of white polyester thread 10x



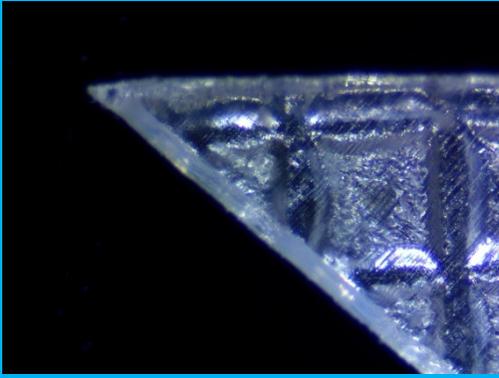
A bit of an adhesive bandage 4x



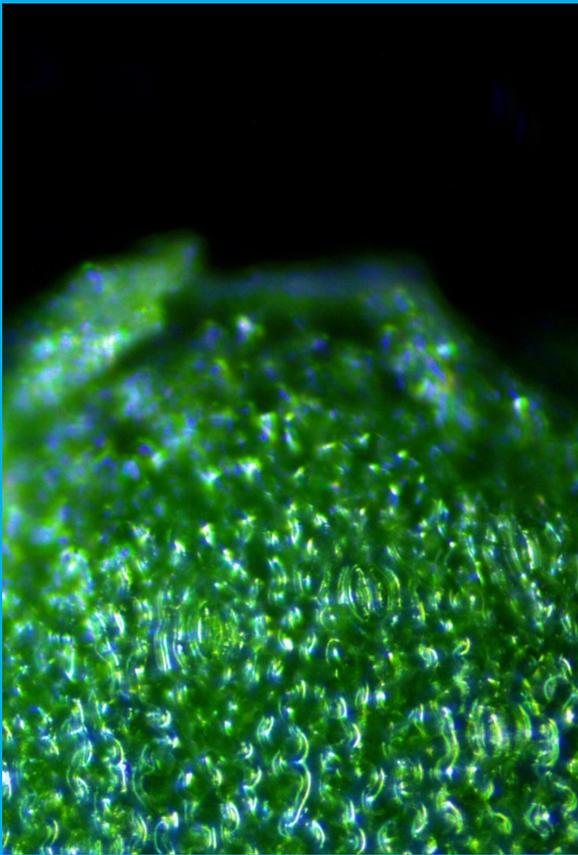
A bit of an adhesive bandage 10x



A bit of red polyester thread 10x



A bit of a medication package 4x



A sample of a fern leaf 10x - it is possible to observe the puzzle-like pattern of fern and the stomata.

### **Conclusion:**

I love epi-illumination - as I said in the previous article it has increased my observations exponentially and although this is not a true darkfield epi-illumination system, it definitely works giving enhancement to the samples. I love it because it allows me to virtually “stand up” upon these thick samples and “walk on them”. Let me suggest once more that you need to try it and directly view through the eyepieces; the beauty of watching a sample from above suspended on a dark background is a great experience that cannot be recorded with the camera because of the flatness of the image.

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(Above in anti-spam format. Copy string to email software, remove spaces and manually insert the capitalised characters.)

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