DIY EPI-POLARIZATION APPLIED FOR MICROSCOPY

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INTRODUCTION:

I have been interested for a while in two things. The first is to demonstrate that the enthusiast microscopist can have at hand a lot of the techniques that because of the cost is sometimes difficult to get. Those techniques that if possible can be made with minimal adaptations to the microscope or camera that we have at home.

The second point of interest is epi-illumination. I have demonstrated it in several of my articles for any form of conventional microscope to expand our range of observations. I have worked on several methods of doing epi-illumination by trying the different techniques that exist and to some extent I have done it well.

Some months ago I noticed that, I could do epi-polar illumination and I tried it for macro observations.

First with a source of polarized light as intense as the LCD screen of a TV set,

Then with the same TV set and a piece of glass upon a dark surface and meeting the reflexion of the screen on the glass, by placing a birefringent object on the glass it became a polariscope.

Finally I placed upon the common LED of a cellphone flash a polarizing filter and directing that polarized beam to an object that was birefringent or had a birefringent object upon it.

With the help of another piece of filter whether watching directly though the second filter I got birefringence, or placing it upon a camera lens I got epi-birefringence, or better said epi-polarization.

This way I demonstrated with simple experiments that it is possible to do epi-polarization at home.

Since my purpose was from the beginning to apply it to microscopy with thick objects, I used the third technique above to try it. The only difference is that I placed between my camera and the cellphone light the lens of a microscope, see below.

DEVELOPMENT:

I removed the head of the microscope, placed a camcorder I have upon it holding by a kind of arm that I made with cardboard pipes from those that come with aluminum foil.

I allowed some space between the microscope and the camera to place the polarizing filter that was going to be the analyzer. The polarizer is placed in this case upon the source of light that was made with the cellphone LED.

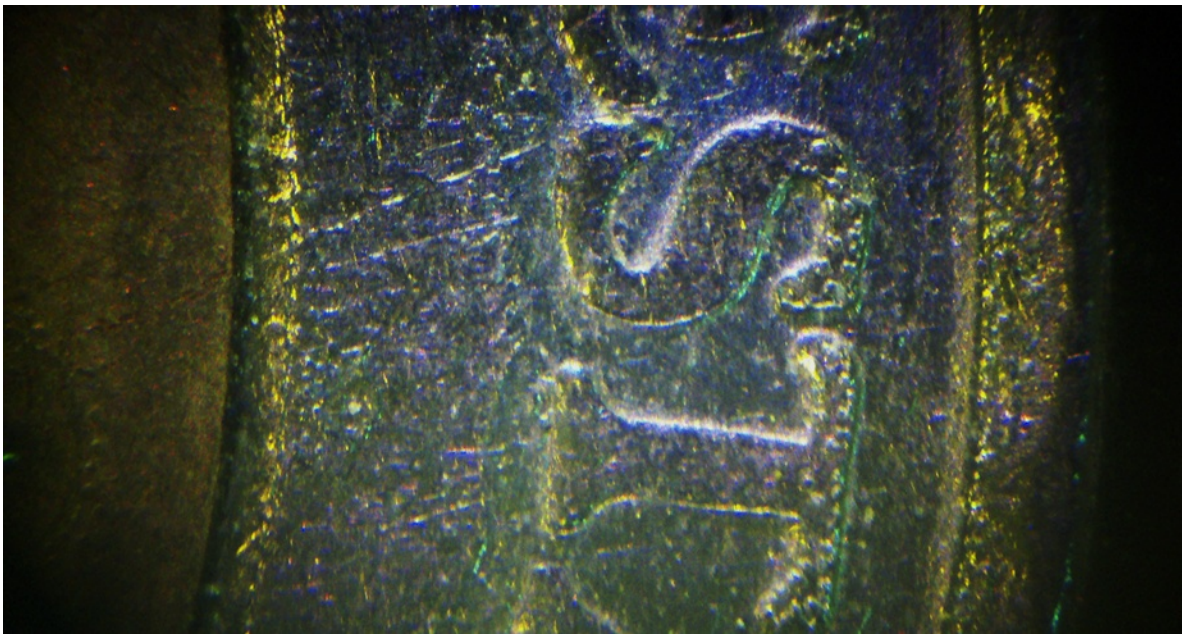
I then placed the samples on a slide and covered them with some transparent tape because this kind of tape is birefringent and adapts to the form of the object.

Since I used metallic objects and these ones are not birefringent at least under these conditions, the tape on them was the object that got the birefringent effect and that adapted to the sample showing parts of change in the stress of the tape, this way making epi-microscope polarization, a micro-polariscope.

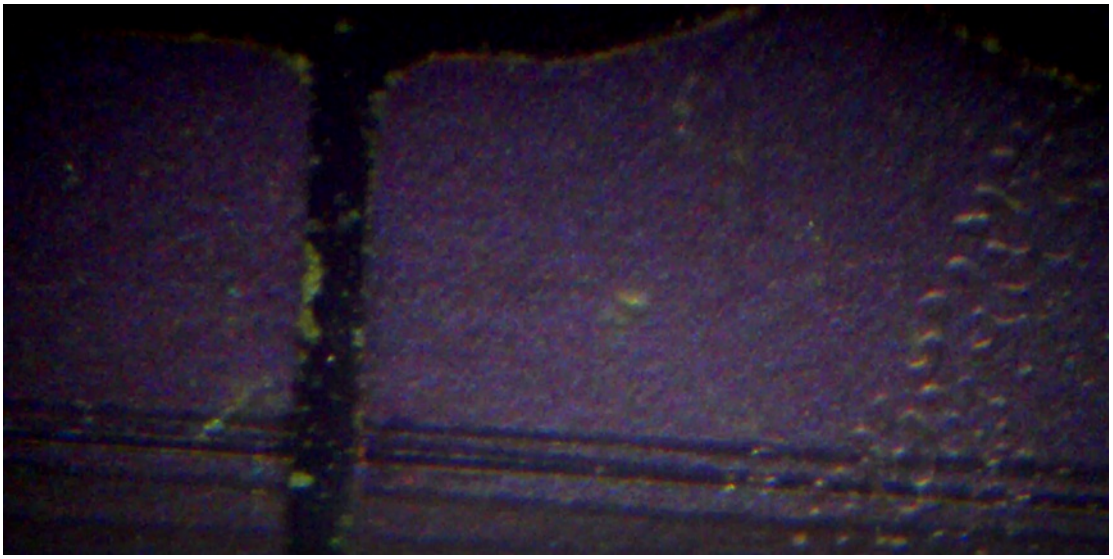
It is true that a real polarizing microscope is more complex that this, but it is an approach to epi-polarization and the advantage is that is done on a DIY basis.

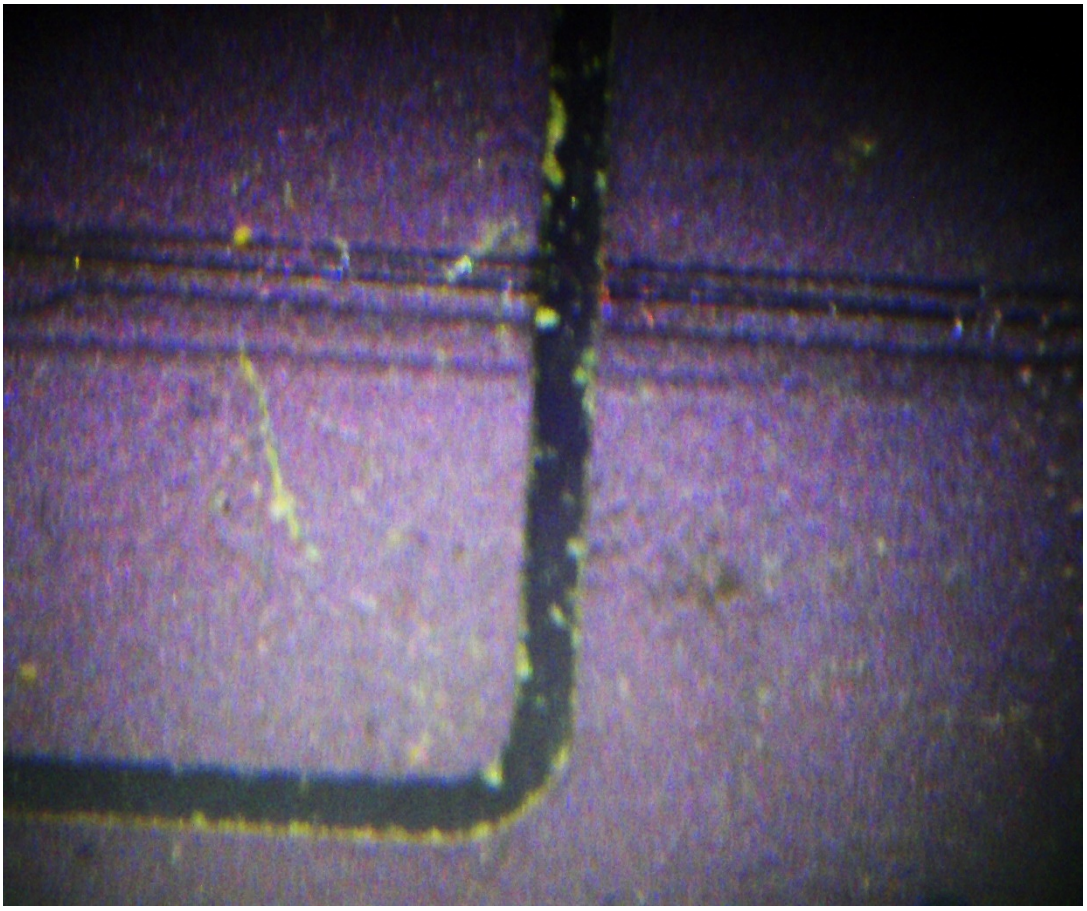
RESULTS:

Part of the back of a Mexican one peso coin covered with a transparent tape and polarized as above 4X.

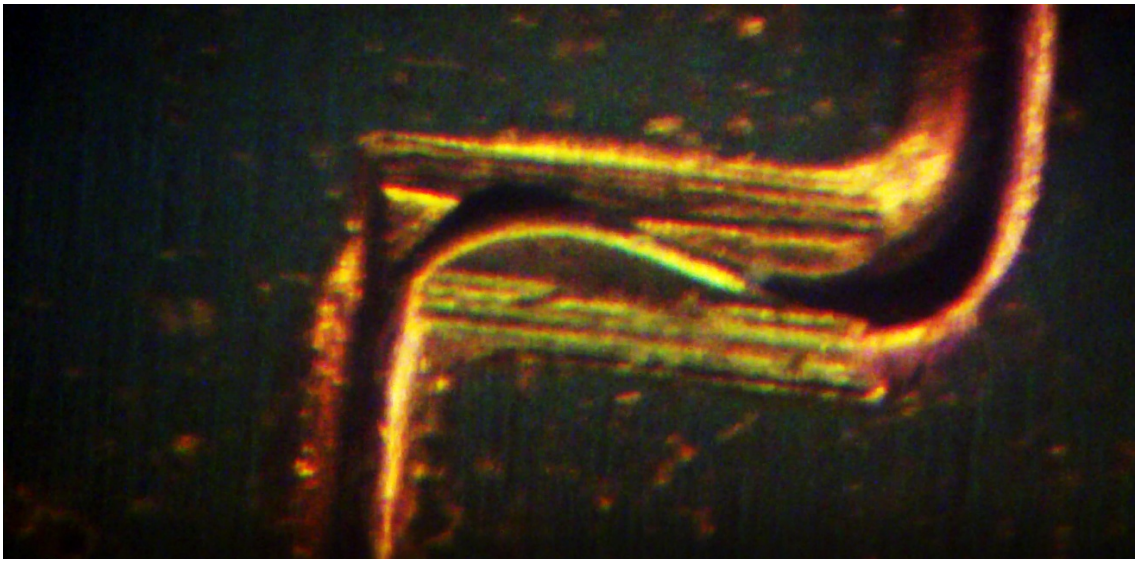


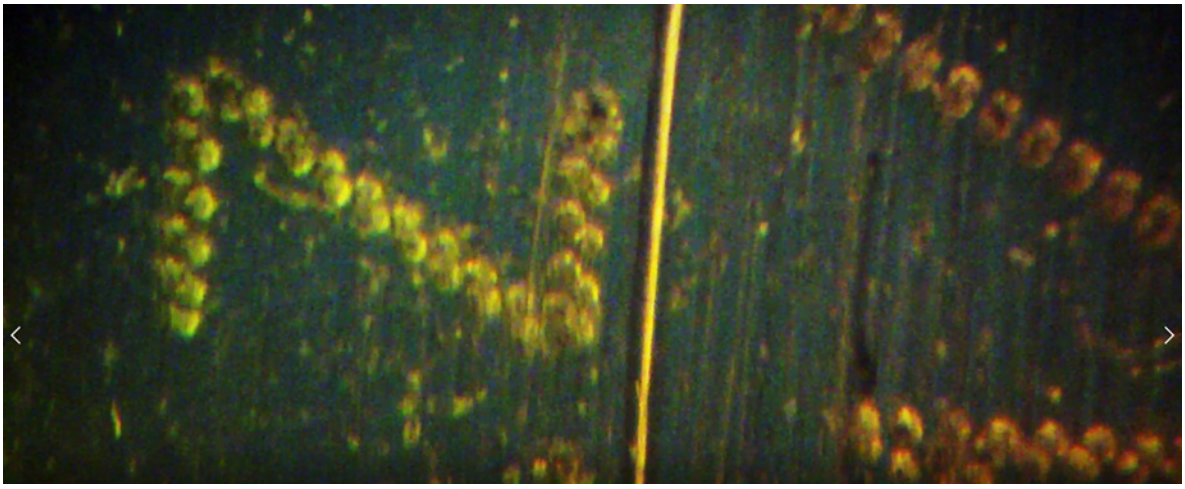
Part of the back of a Mexican one peso coin covered with a transparent tape and polarized as above 4X.





Parts of a SIM card covered with a transparent tape and polarized as above 4X.





Part of a USB connector covered with a transparent tape and polarized as above 4X.

CONCLUSION:

Did I achieve epi-polarization for microscope samples? Yes I did.

I then can state that if there is on a thick sample something birefringent it will be show with this experiment or otherwise if the thick sample by itself is a birefringent object it will show its birefringence.

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