

## DIY POLARIZING MICROSCOPE

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### INTRODUCTION:

Since I started with this beautiful venture of microscopy I have always looked for methods of improving the contrast of my samples apart from the features that my microscope already has. I like to explore if possible other methods of illumination and I love to produce them on a DIY basis.

This time I am going to present a form of fitting out a “simple” compound microscope as a polarizing microscope with extremely good results.

### DEVELOPMENT:

The inspiration for using polarized light came from a video that I found on YouTube that showed the use of two polarizing filters taken from the LCD display of an old cell phone, <https://www.youtube.com/watch?v=dXnp7VZaMjU>. I followed the instructions given in the video and obtained some old cell phones of my own from my relatives and friends and opened them to access the filters. I also used the display of an old calculator.

For creating a polarizing microscope it is very straightforward; one of the filters is placed between the objectives and the eyepieces and/or the trinocular, this is called the analyzer, and one upon the illumination system that will be the polarizer and that is all.

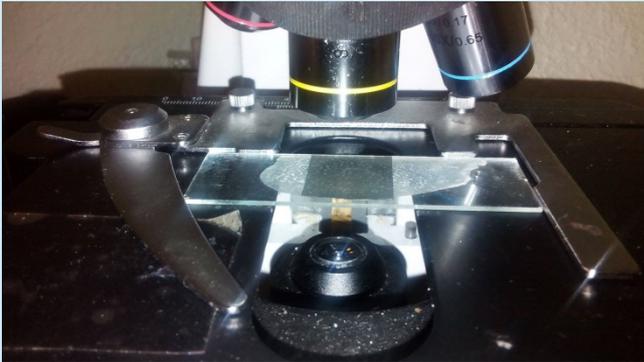
Here is the method I used.



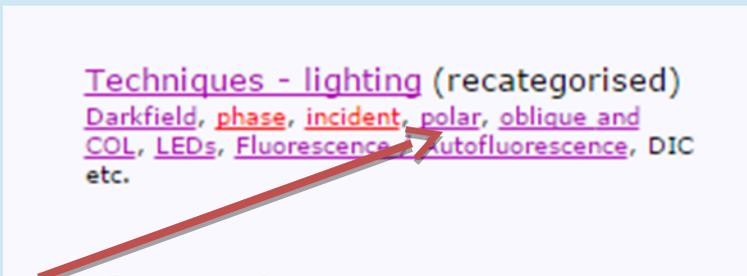
I removed the trinocular head and placed the filter on the base of its lowest optical element.



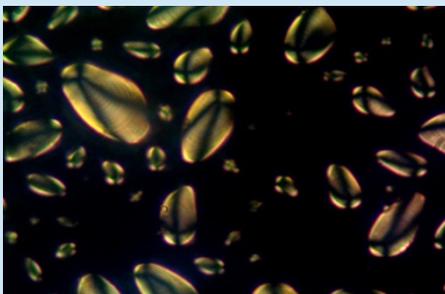
The other method that I used was to place the analyzer filter directly upon the sample and the polarizer for both methods upon the illuminator. Both methods performed very well.



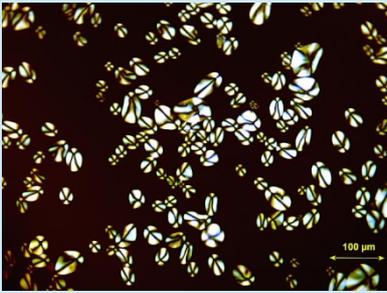
The question arises as to whether all samples can benefit from using polarized illumination, the answer is no. The sample must be birefringent which in simple terms means a sample is made out of a substance capable of splitting light when it is linearly polarized. It is widely known that many crystals are excellent when seen under polarized light and there are tons of examples in *Micscape* magazine - look in the Polar section in the Library. The photo of table salt below shows a non-birefringent chemical, sodium chloride.



What to see that we have at hand to check that this DIY POLARIZING MICROSCOPE works? I answered this question with the *Micscape* article: <http://www.microscopy-uk.org.uk/larry/project2/proj2b.html> Here the author mentions that a good sample to see under polarized light is potato starch, so I placed some under my objectives and look, the results were outstanding:



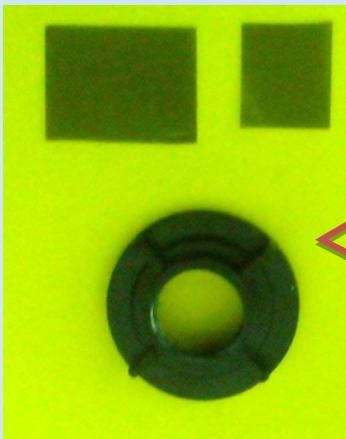
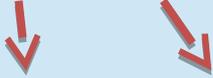
Comparable to those found on the Internet seen under a real polarizing microscope:



(Taken from the page <http://www.micromagus.net/pharma/starch.html> just for educational purposes to illustrate the comparison between my image on a DIY basis and a real polarizing microscope.)

Here is my polarizing set.

POLARIZER ANALYZER

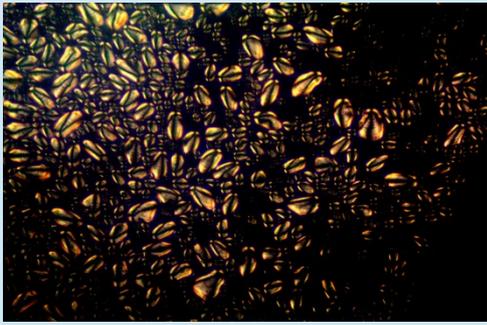


Because the polarizer was not big enough to fit upon the illuminator, I used this piece of opaque black plastic to cover part of the illuminator and to allow just polarized light to pass - this was also useful to rotate it.

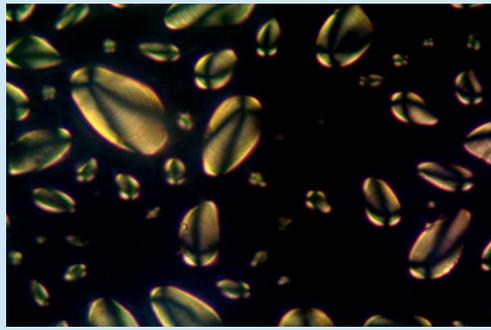
This way:



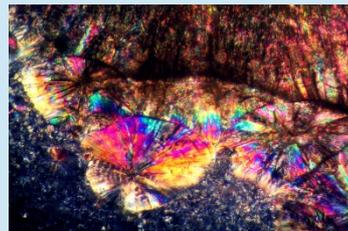
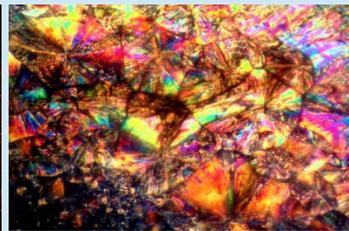
RESULTS:



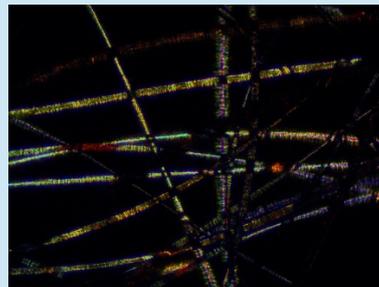
Potato starch 10x



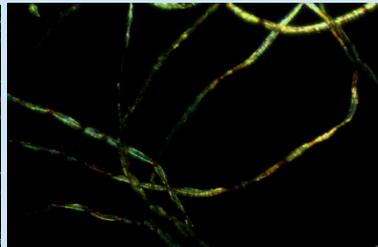
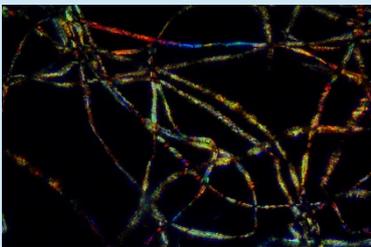
Potato starch 40x



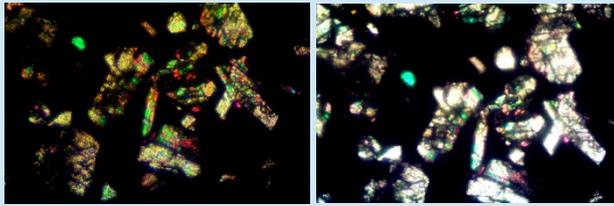
Metamizole crystals 10x



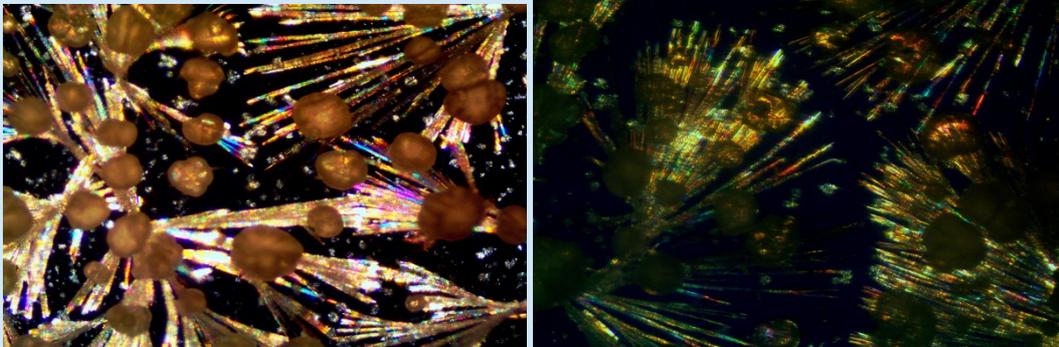
Dog's fur



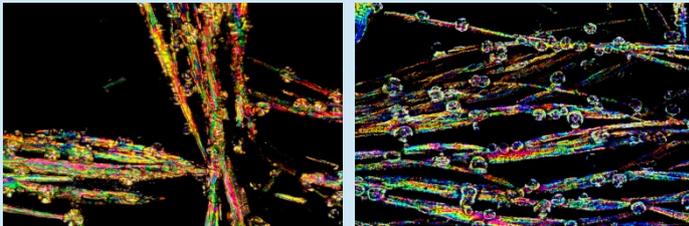
Cotton fibers 10x



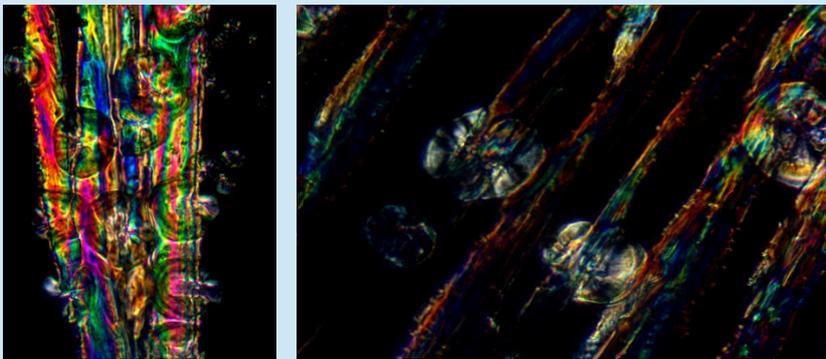
Sodium bicarbonate crystals 10x



Diclofenac 10x



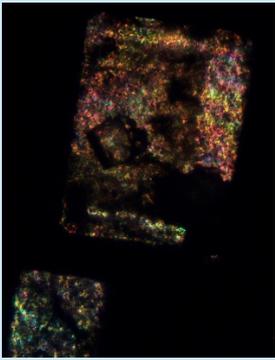
Another sample of Diclofenac 10x



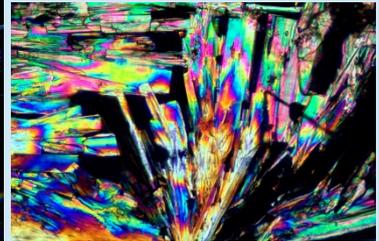
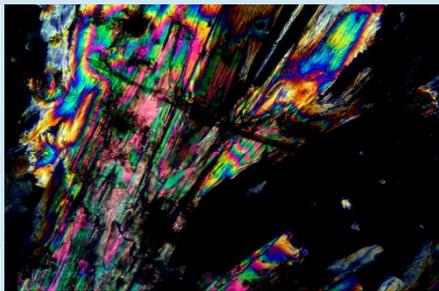
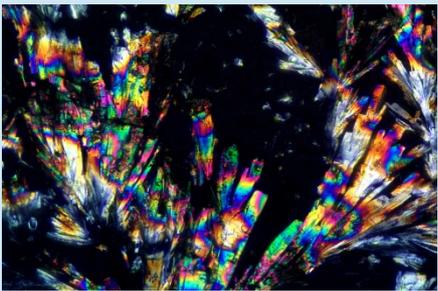
Diclofenac 40x



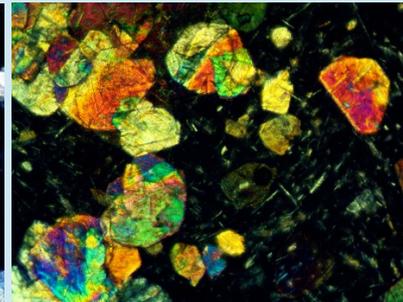
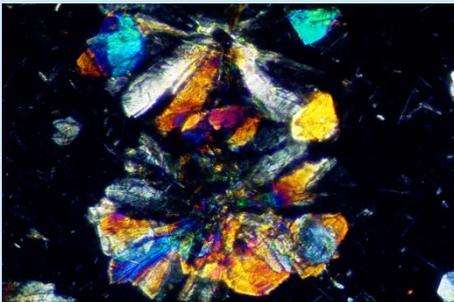
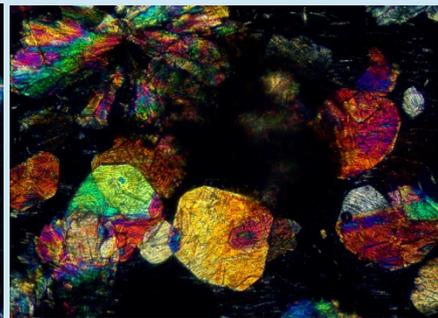
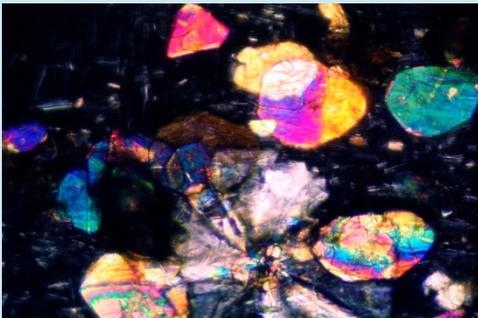
Salt crystals 10x



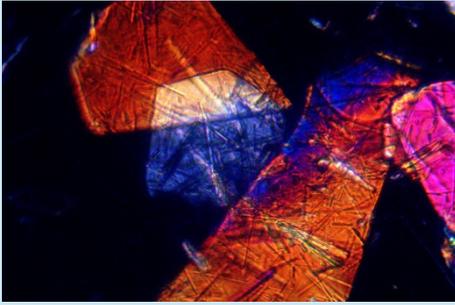
Sugar crystals 4x



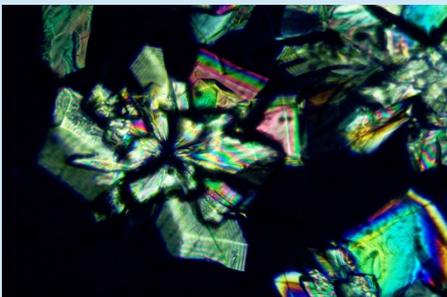
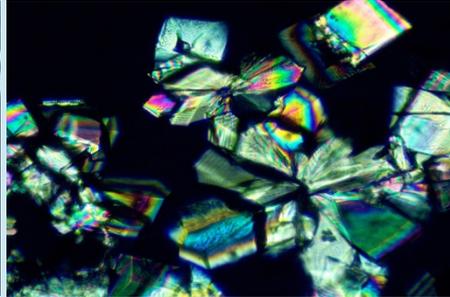
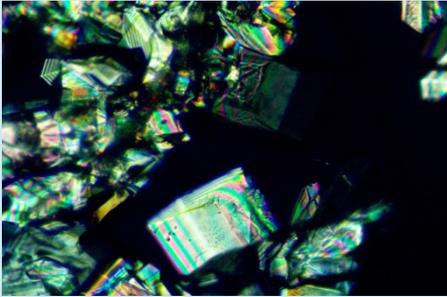
Metformine 10x



Trimethoprim-sulfamethoxazole 10x



Trimethoprim-sulfamethoxazole 40x



Dextromethorphan 10x

#### CONCLUSION:

Given the results above and the easy way to produce on a DIY basis a polarizing microscope, nobody from now on should lack a polarizing microscope. Nobody in this world should miss the experience of observing the beautiful colors produced by the different photoelastic and/or birefringent things around us.

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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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[www.micscape.org](http://www.micscape.org)