

## EPI-ILLUMINATION WITH A CELLPHONE FLASH LED

BY: ALEJANDRO ARIEL GARCIA ARRIAGA

COACACLCO DE BERRIOZABAL ESTADO DE MEXICO, MEXICO.

### INTRODUCTION:

I love epi-illumination and at any chance I can produce it I do, since it represents an outstanding complement for the transmitted observations that are commonly made with most microscopes such as brightfield, darkfield, Rheinberg, near infrared, etc. since this technique allows us to see thick objects' surfaces.

[Last April 2016](#) I presented an article that was accepted for *Micscape* about epi-illumination using LEDs that I attached to the objectives with some elastic and that I used to illuminate thick samples with a background of coloured paper. [In May 2016](#) I also presented another article on the same topic and the same form of illumination but this time samples were surrounded by a dark back ground. In [November 2016](#) I explored epi-Rheinberg.

Today I want to present another approach for this technique, by using a cellphone which nowadays has become a common device and which is most of the time equipped with a lot of functions including "a lamp" or a flashlight for the camera. This can be turned on to illuminate the surroundings with a kind of powerful light beam and that we can take advantage of to illuminate from above our samples.

### DEVELOPMENT:

To illuminate the sample with the cellphone it should be just turned on and directed onto the sample presented below the 4x or 10x objective of the microscope or any one that allows some space between the sample and the objective, getting it the closer the better to illuminate.

The cellphone can be held by hand, but it is uncomfortable and obviously the beam of light becomes unstable so it is necessary to create a support.

I have been regularly making holders for cameras or devices that I use to complement the microscope. I use stiff cardboard pipes that come with the rolls of aluminium foil and with the transparent films to wrap food. I cut a pipe into pieces and one of those pieces I cut vertically to close it a little and insert it within the remainder in order to lift or lower the device I am trying to use. I mount the roll upon a base glued with cyanoacrylate.

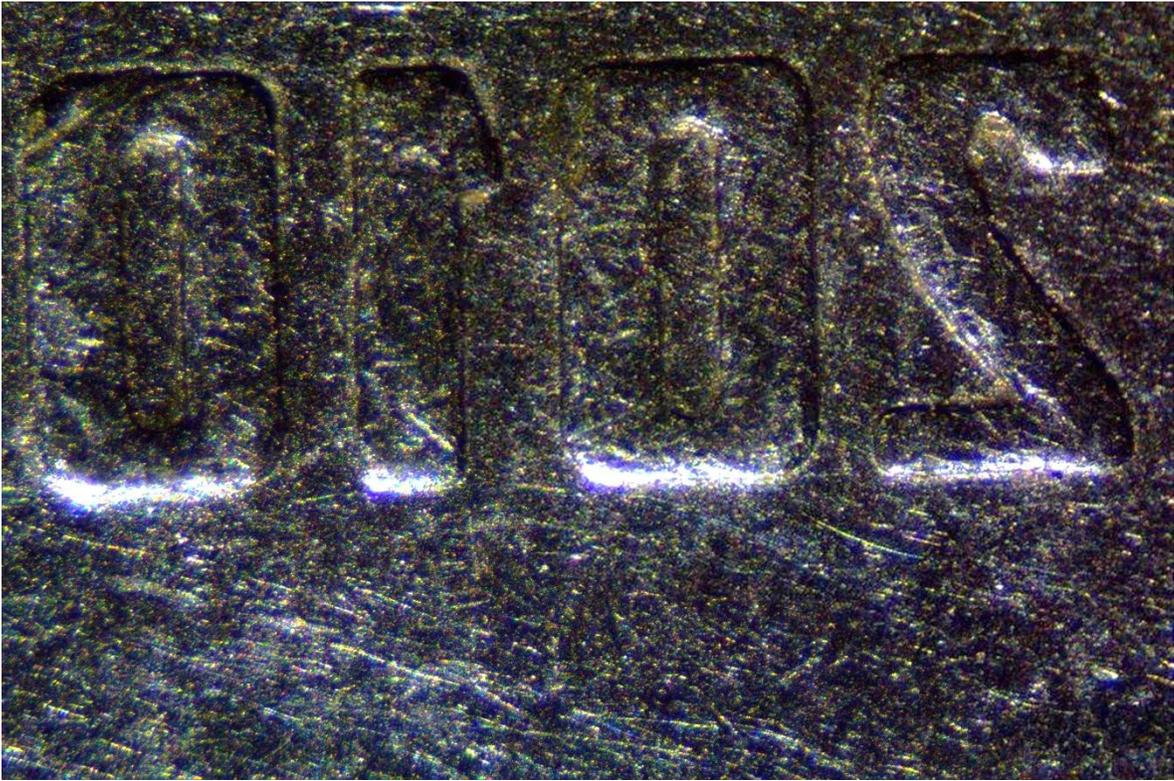
Look at the pictures.



The samples I love the most are the very thick ones such as coins, needles, etc, although it is also possible to study a transparent sample and observe it from above.

For large samples as in the case of coins, to create a panorama of a part of it, it is possible to use IMAGE COMPOSITE EDITOR, which is free software that can be downloaded to stitch a sequence of several photos to complement each other.

RESULTS:



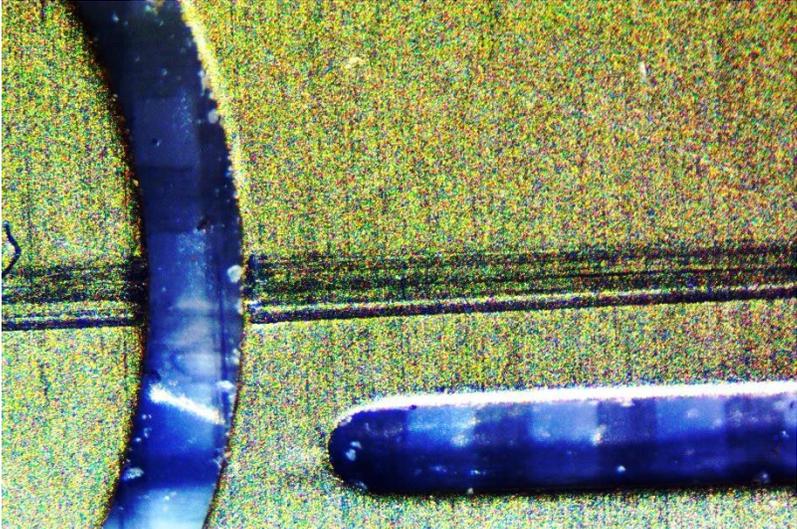
The year of coining of a Mexican 50 cent coin 4x



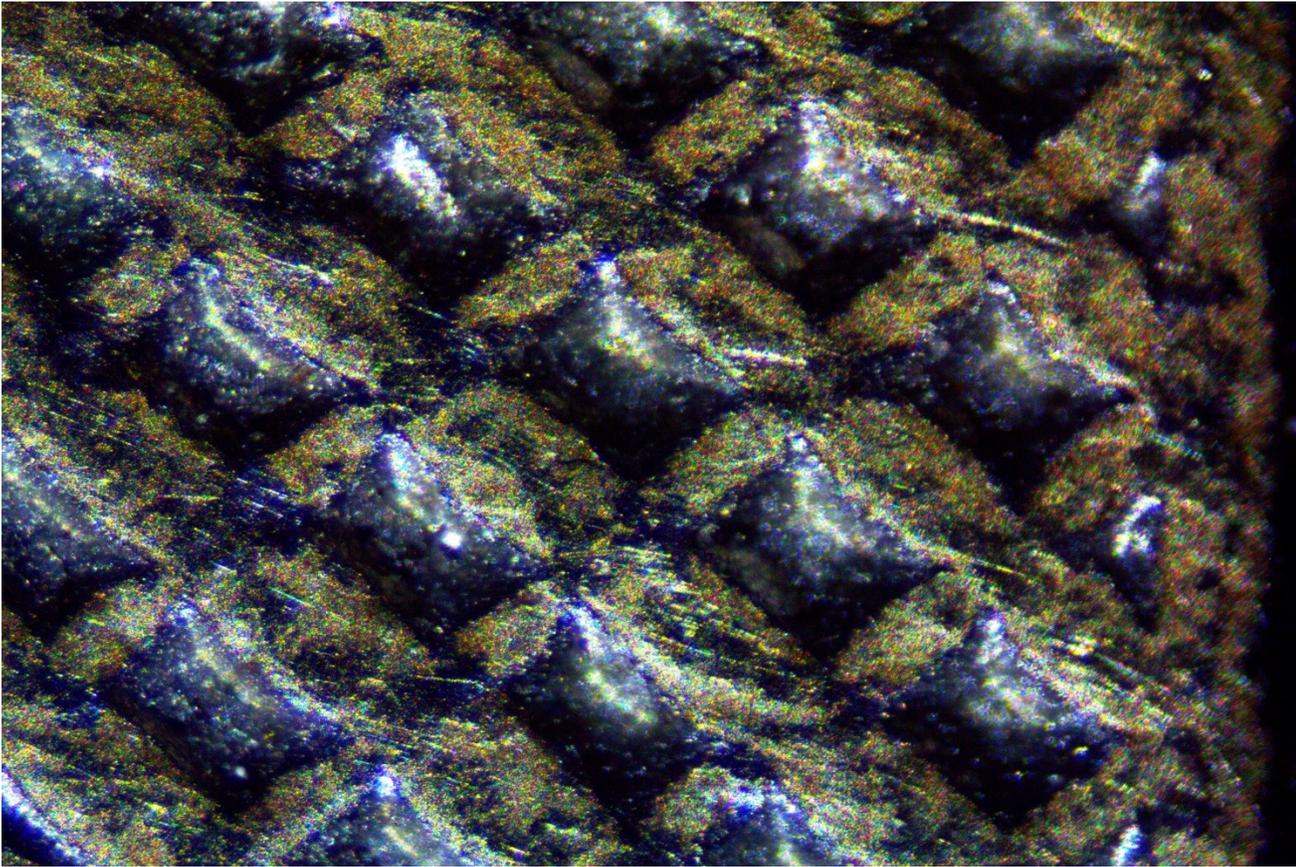
Cent symbol of the same coin 4x



The eye of a needle 4x



Part of a SIM card 4x



Part of a textured door key 4x

#### CONCLUSION:

As illustrated above, a cellphone, which is a popular device and almost everybody has one at home, can be applied to illuminate samples under the microscope, so at this point nobody should miss the opportunity of trying it.

Let me remark that if done well, the results above can be beautiful; believe me that the beauty is best seen when looking through the eyepieces.

Email author: doctor2408 AT yahoo DOT com DOT mx

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

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