



Cameca 1280 Blue LED Sample Illuminator



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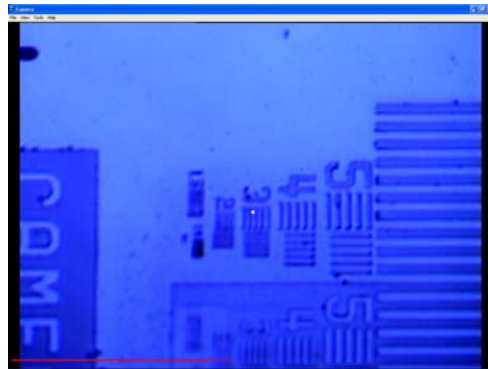
Cameca 1280 Blue LED Sample Illuminator

Overview:

The Cameca 1280 ion probe has a sample illuminator and camera system which allows the user to move the sample stage to the desired location and view the ion probe pits being made. The Cameca 1280 comes with a white incandescent light source to view features as small as $\sim 3.5\text{ }\mu\text{m}$. As the Cameca 1280 can create pits as small as $0.3\text{ }\mu\text{m}$, there is a need for a system to view features smaller than $3\text{ }\mu\text{m}$. This document details creating a replacement light source which uses a blue LED module instead of an incandescent bulb. As can be seen in the following photos, the new light source allows seeing features as small as $2.5\text{ }\mu\text{m}$. The improvement is due to the blue LED source being very monochromatic (minimizing chromatic aberration effects) and having shorter wavelength light to resolve smaller features.



Sample viewed with the incandescent light source and the image detail below.



Sample viewed with the royal blue LED light source and the image detail below.

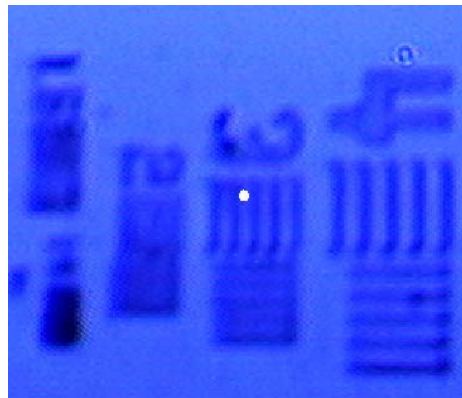
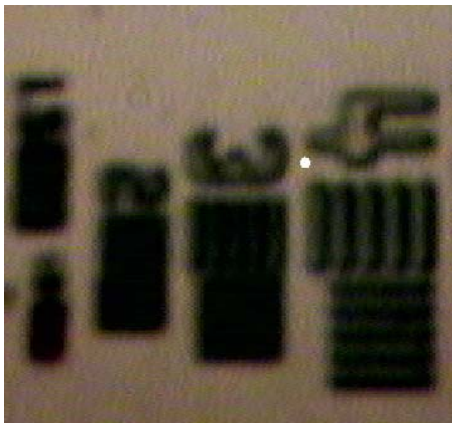


Figure 1. CAMECA test grid imaged optically in an IMS-1280 by white and blue light at WiscSIMS. Note improvement for lines spaced $3\text{ }\mu\text{m}$ apart

The new blue LED illuminator module was designed to be a plug-in replacement for the Cameca 1280 incandescent light source. It uses the same mount, power supply, and connector. If desired, it takes a few minutes to exchange one for the other. No other changes are needed.

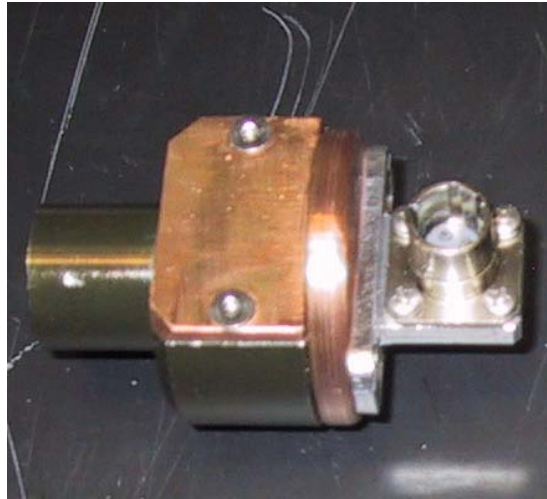
Cost for the LED module and power connector is under \$120. The majority of the cost is the metal housing (\$750) and labor to modify it.

Construction Details:

The Cameca 1280 incandescent and new blue LED light sources are show below.



Cameca 1280 incandescent light source



Blue LED light source

Parts Needed For Blue LED Illuminator:



Royal Blue LED Light Source (455 nm wavelength)

Luxeon I Star Hex High Power LED Royal Blue

Mfr Part#: [LXHL-MRRD](#)

Cost: \$6.00

Website: <http://www.philipslumileds.com/products/line.cfm?lineId=1>



Jaeger Connecteurs

Série Miniature Push-pull Natto, Embase male carrée, 3 pin
(533 233 006)

Page 33 of the Jaeger Connecteurs pdf catalog

<http://www.jaegerconnecteurs.com/pdf/CatalogueCylindrique-entier.pdf>

A single connector can be purchased from Cameca for \$100.

Cameca part# 0091310821, Conn Mal 3Pin 533233 MINI/JAEGER



Illuminator Housing

The housing is best machined from the drawings on the next page.

A housing could be purchased from Cameca (Part# 0029250526) for \$750 but this requires significant machining to adapt it to the LED light source.

Miscellaneous

red and black wire, heat shrink tubing, 50 Ohm ½ watt resistor,
1 1/16" O-ring, heat sink compound, super glue.



Disassembled Blue LED Illuminator assembly.

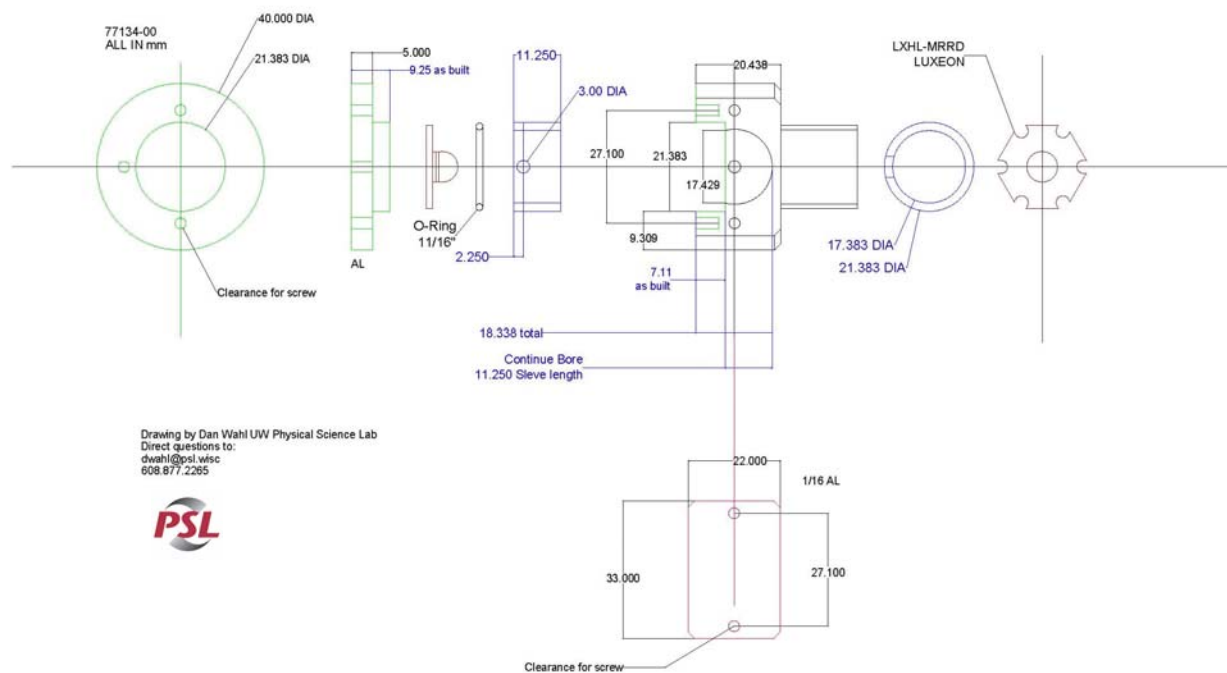


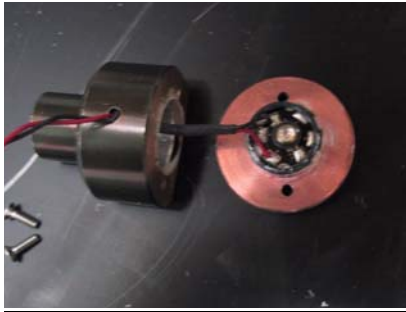
Figure 2. A mechanical drawing for the modified Cameca illuminator housing the LED module

Assembly Steps:

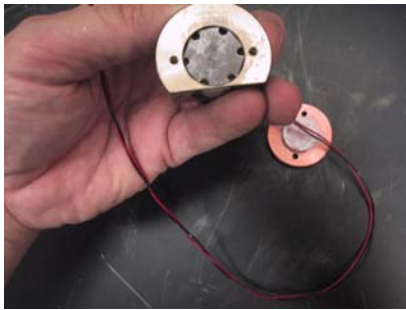


Connect the red (positive) and black (negative) wires to the LED module with the correct polarity.

Place the wires through the O-ring and then the hole in the aluminum spacer and then the housing. Insert the aluminum spacer in the housing.



The O-ring will sit on top of the LED and act as a cushion and insulator when tightened down.



Insert the O-ring and LED and then the copper back plate and tighten.



This is a view after the back plate is fastened showing the O-ring in between the aluminum spacer and the LED.



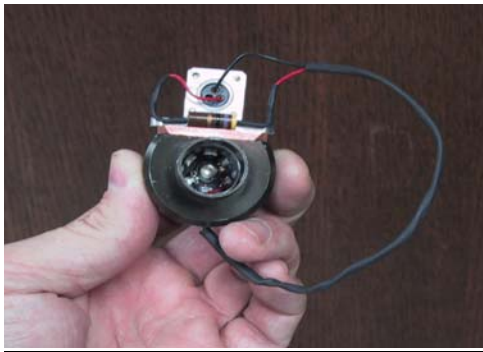
This view shows the LED assembly with the LED in the middle.



Install the copper side plate and connector assembly.

Super-glue a 50 ohm $\frac{1}{2}$ watt resistor to the assembly as shown.

Use heat shrink tubing on both ends of the leads closest to the body to prevent contact with the metal assembly.



Connect the black wire to pin 2 of the Jaeger connector.

Connect the red wire to one end of the resistor.

Connect the other end of the resistor to pin 1 of the Jaeger connector.

The assembly is now ready to be installed.

For additional information see:

<http://www.psl.wisc.edu/projects/small/wiscsims>