Testing with Lucent’s MEM chip over glass protector
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The glass of Lucent’s MOEM chip has shown for long time signs of high reflection (see Fig 1). We have speculate all this time, that the reflection caused by that over glass protection of the chip may be responsible for not allowing the camera to focus on an object of the MEM mirrors.

Figure 1: The Lucent’s Mirror MEM chip. The reflection from the over glass is very dominant. The overglass has layers of antireflecting coatings in both sides for the wavelength of 1.5 µm.

After acquiring from Lucent just the piece of the glass that covers the MEM chip we were able to investigate its properties in more depth. One of the tasks that we would like to proof experimentally is whether its reflectance prevents us from imaging of any micro mirrors.

In order to proof the above we took one micro-mirror (~700 µm diameter) made by Fraunhofer and we placed it opposite of an image that contains the word “Drexel University”. Opposite of the mirror placed a camera that attempts to focus on the image through the micro-mirror (see Fig. 2).

Figure 2: Diagram of the experiment setup
The Fraunhofer micro mirror is placed on a post and is sitting on the same axis with the camera as it is shown above. We first capture an image of just the micro-mirror (Fig. 3) as it is seen from the camera's point of view.

We then attempt to focus on the image through the micro-mirror. As we can see from Figure 4 we can indeed do so. The result looks like it is coming from a pinhole camera.

As we can see on Figure 4 we have achieved to focus on the image and as result we can read back the letter “D” from the word “Drexel University” that is written on the image surface. If we rotate the mirror slowly we will be able to read the rest of the word that is written. Then by doing image mosaicking we reconstruct the entire image.
Now we will put the piece of glass that was given to us from Lucent which is the same as the over glass that covers the MEM’s chip surface in order to protect the mirrors. By doing this experiment we will be able to observe whether the reflection of that glass is strong enough to prevent us from focusing on an imaging surface through the mirrors and not through the glass surface.

Therefore, for this task we place the glass in front of the micro-mirror that we used previously and we keep the rest of the set up the same as it is described above. We see on Figure 5 how the glass is placed in front of the mirror. The particular image is taken from the point of view of the camera.

As we can see on Figure 5 the reflection of the glass is very significant and it kind of looks like with Figure 1. The reason that the glass here is a bit more reflective than in Figure 1 it’s because the light intensity in this case was much higher and also the camera that the two pictures was take was different as well.

On the next and most crucial step we will attempt to focus off the micro-mirror on the image plane. As we see on Figure 6 such thing is impossible and the only thing that we achieve is to focus on the image plane off the glass surface.
Figure 6: The camera is focused on the image through the glass surface on top of the mirror.

We can observe that the Figures 5 and 6 seem to be a little bit distorted. This is due to the fact that the glass plate in front of the mirror was holed by hand and as result it wasn’t able to be kept perfectly still when the picture was captured.

From all the above, we can come to conclusion that we could possibly achieve and do imaging off the mirror chip from Lucent but the reflection of the over glass is preventing us from achieving this task.