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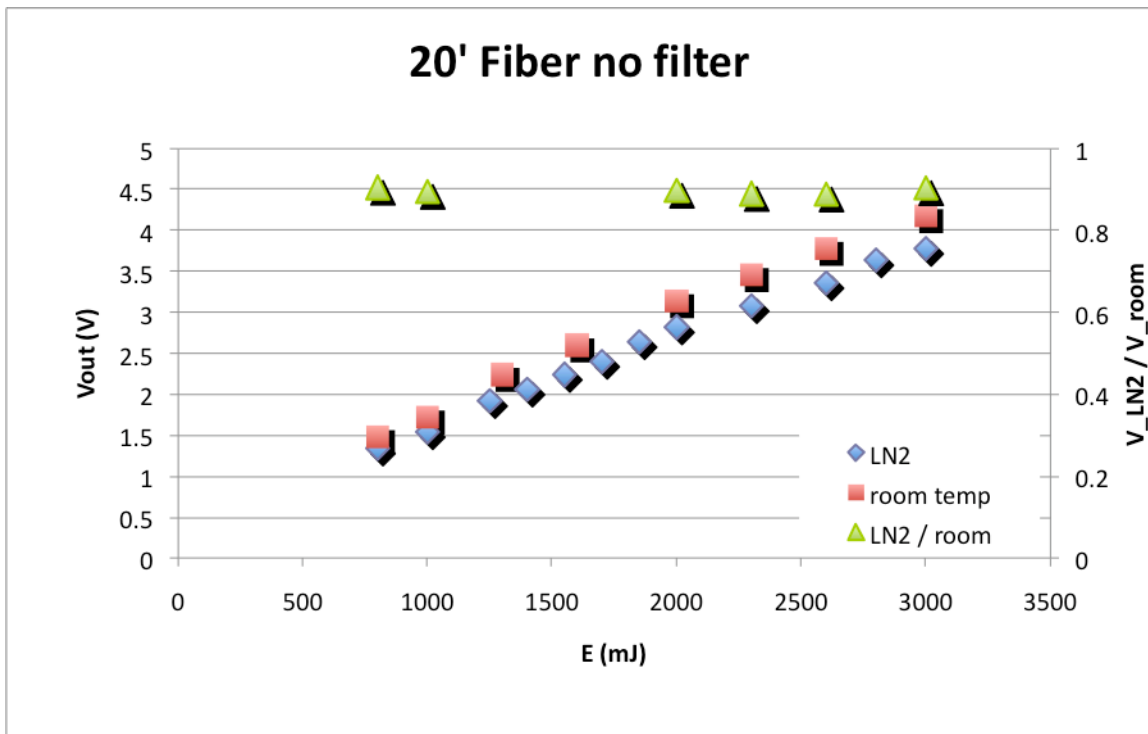
Fiber Test Summery

8/1/08

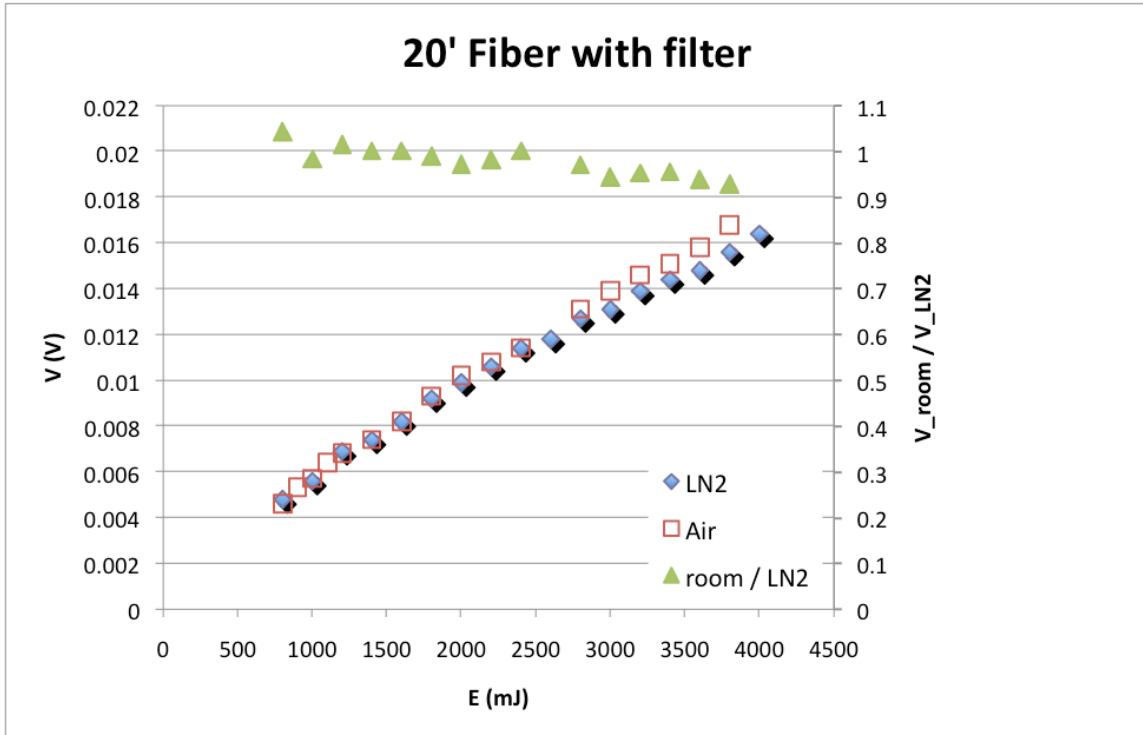
Length, temperature, and endurance tests were performed on several quartz fibers used in the bell jar cathode tests. Also, the fibers used in the double cathode system were tested and compared. All tests were performed at atmospheric pressure with a phototube of known quantum efficiency. The output voltage recorded is not the integrated voltage, but rather the peak voltage of the pulse. The energy recorded is a setting on the flash lamp used.

- Temperature Test

The output voltage of the 20' fiber was tested at room temperature (20°C) and when it was submersed in liquid nitrogen (LN2) (-200°C). This test was performed with and without a 240-260nm filter.



Graph 1- Room temperature and LN2 test of 20' fiber without a filter



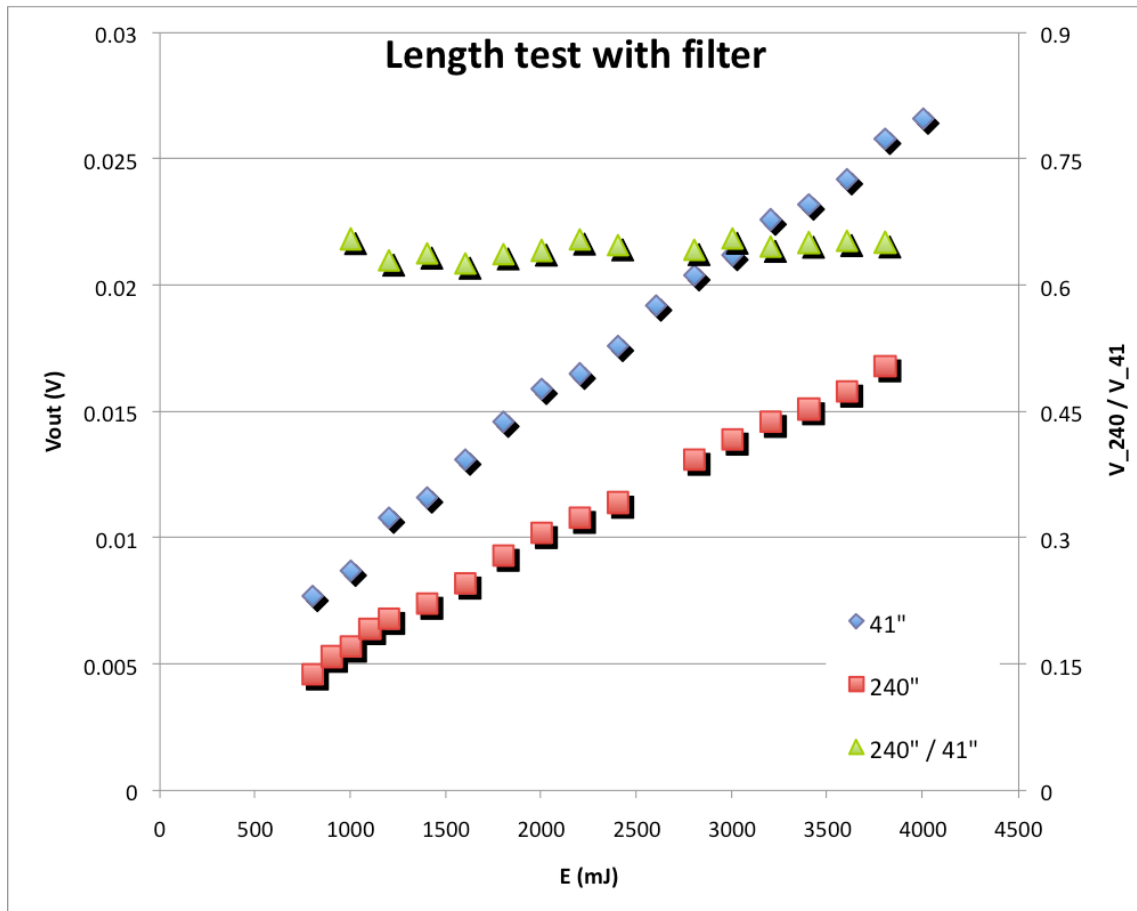
Graph 2- Room temperature and LN2 test of 20' fiber with the filter

Very little difference is seen in the output voltage at different temperatures. The output voltage is slightly higher with and without the filter at room temperature, but only by about 10%.

Note- since the difference is so small, all future tests are done at room temperature

- Length Test

The voltage output of two fibers, a 41" fiber that had been used for a few weeks in the bell jar and a new 20' fiber, were measured and compared.



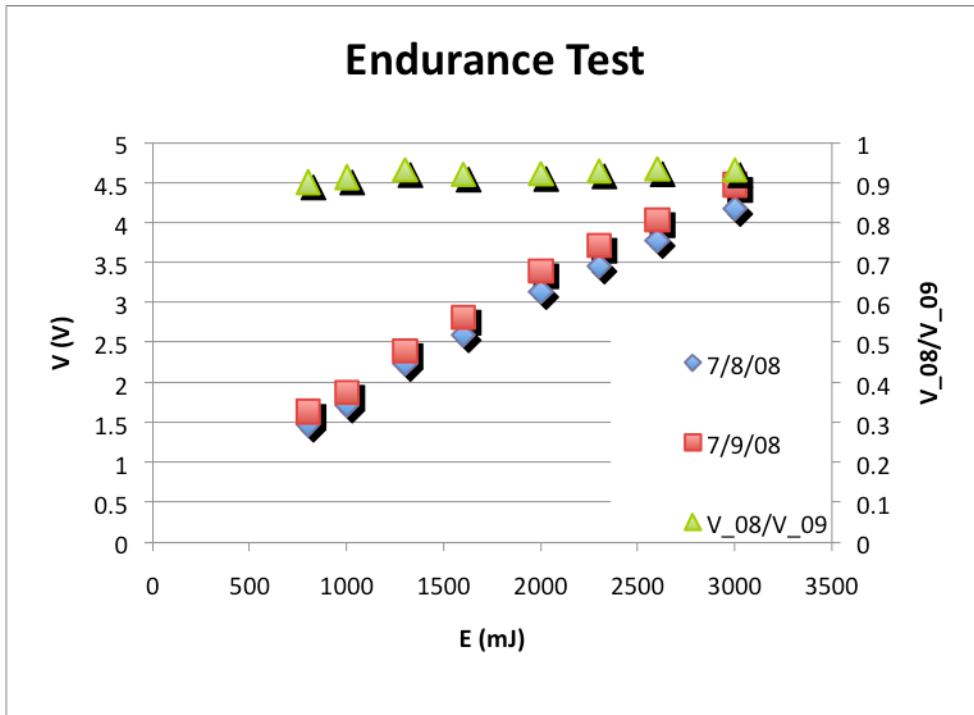
Graph 3- 41" and 240" fiber test

Length clearly effects how much light is outputted from the fiber. In the longer fiber it is possible some light is absorbed or leaked out.

Also, the 41" fiber was older and had been used more than the new 20' fiber so it is possible the voltage difference due to length shown here is less than if two new fibers were compared.

- Endurance Test

To test if prolonged use affected the fiber, the 20' fiber was left pulsing overnight with an energy setting of 2000mJ at 1.5Hz. Measurements were taken on 7/8/08 and then later on 7/9/08 after a night of pulsing.



Graph 4- Plot of  $V_{out}$  before (blue) and after (red) a night of pulsing

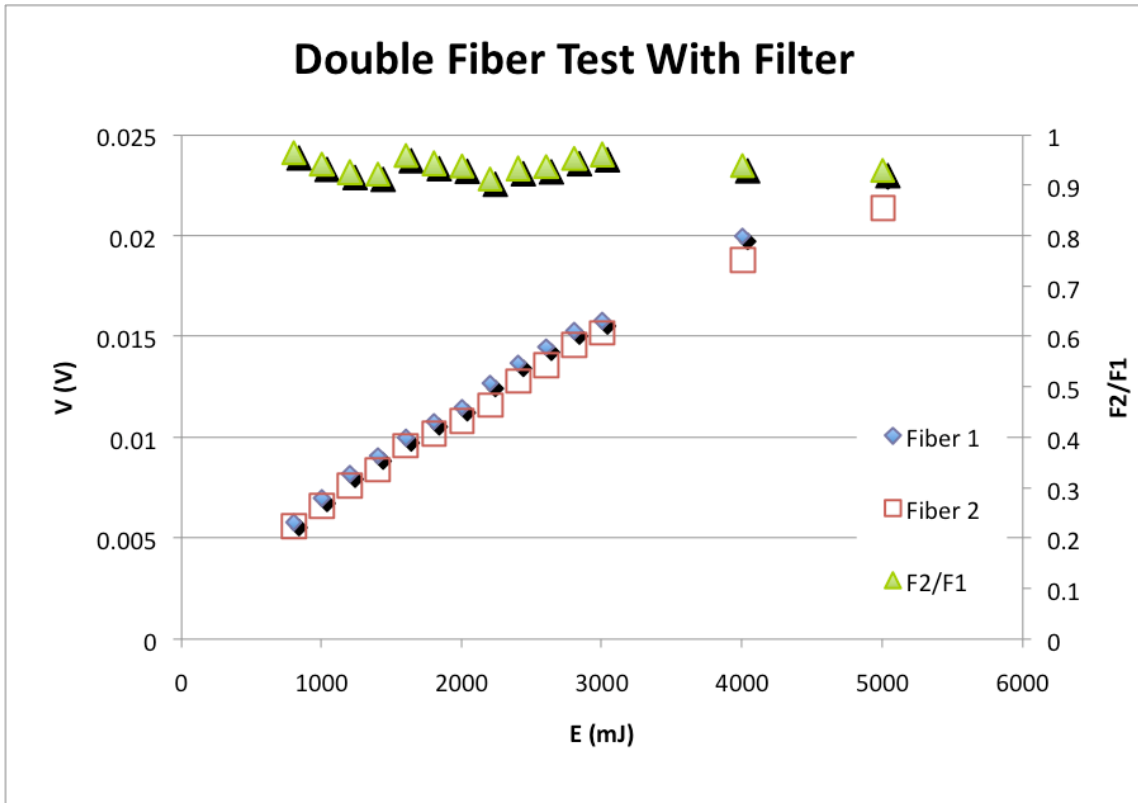
After a night of pulsing the fiber did not get worse, but actually got about 10% better.

- Double Fiber Test

A second apparatus was made to allow two cathodes to be tested in the belljar. This used two ~6' fibers made from the 20' fiber used in the above tests. The output voltages of those two fibers were tested and compared both with and without the 240-260nm filter.



Graph 5- Fiber 1 and Fiber 2 comparison with no filter



Graph 6- Fiber 1 and Fiber 2 comparison with the filter

In the 240-260nm range, both the output from both filters is pretty much the same. There is more variation without the filter, where Fiber 2 has a high output voltage, but never more than 30%.

Conclusions- The fiber operates roughly the same at room temperature and when in LN<sub>2</sub>. Studies of how well it operates after prolonged exposures should possibly be done.

The length of the fiber, and most likely the age, significantly affect the fiber's quality.

One night of pulsing did not significantly effect the fiber, though prolonged use most likely does.

In the 240-260nm range Fiber 1 and Fiber 2 are very similar, however more variation in quality is observed when all output wavelengths are considered.