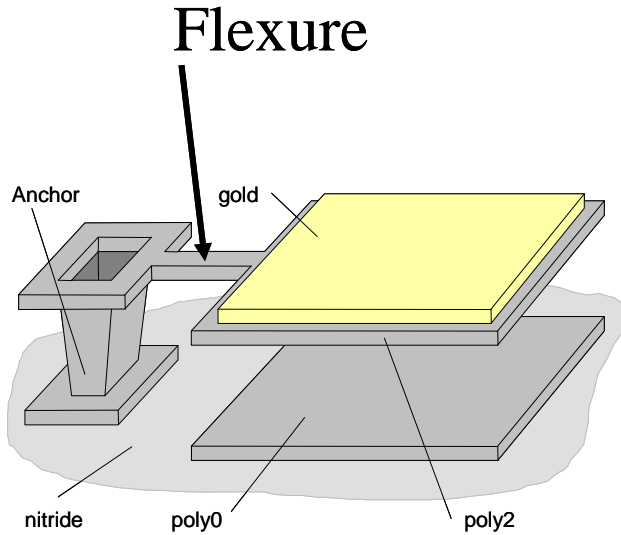


Homework Micro-scale Engineering #1, Due Date: September 9, 2008

The following micro-mirror has been analyzed during the class. We would like to increase the pull down voltage from 1.9 Volts to a level close to 5 Volts. Please change one of the dimensions of the flexure or the mirror for the increase. Note: The pull down voltage does not need to be exactly at 5 Volts. As long as it is between 4 and 6 Volts, the new design is fine. (10 points)



$$V = (z_0 - d) \sqrt{\frac{2Nkd}{NE_0A}}$$

$$k = \frac{Ewt^3}{4L^3} + \frac{\delta(1-\nu)wt}{2L}$$

when $\delta = 0$

$$k = \frac{Ewt^3}{4L^3}$$

$4L$

When, $A = (250 \mu m)^2$, $z_0 = 2 \mu m$

The flexure: $40 \mu m \times 10 \mu m \times 0.5 \mu m$, $E = 169 \text{ GPa}$

$$k = 0.8 \mu N / \mu m$$

$$d = \frac{1}{3} z_0 = 0.7 \mu m$$

$$V = 1.9 \text{ V}$$