Environmental Effects on SU-8 Flexures in MEMS Devices

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Theoretical MEMS Structure



Actual MEMS Device

- SU-8 2002 and 2025
- 100 microns in Length (X)
- 90 microns Width (Y)
- 50 microns in Thickness (Z)
- Measurements designed for resonant frequency



Source: Tianbo Liu

Testing Procedure



Temperature Stabilization - 5 minutes Humidity Stabilization - 15 minutes



Experimental Apparatus - Humidity



General Measurement



Experimental Apparatus - Temperature





Results - Humidity



• Resonant frequency decreased by app. 2 Hz or 0.2%

 Scan length followed an unusual trend, largest change was 0.04 cm or a 9% shift.

Results - Temperature

9



- Resonant frequency decreased by app. 15 Hz or 1.5 %
- Scan Length increased by 0.05cm or 11.4 %

Bulging Effect - Convex Deformation



Bulging Effect - Convex Deformation



Conclusion

• Temperature and Humidity have different effects on the Youngs Modulus, Shear Modulus and Mass Loading of the MEMS Device.

Property	Increase in Temperature	Increase in Humidity
Youngs Modulus		?
Shear Modulus	?	?
Mass Loading	?	

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13

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