Absolute Pressure Sensors

Z. Celik-Butler, D. Butler
and M. Chitteboyina
Nanotechnology Research and Teaching Facility
University of Texas at Arlington
http://www.uta.edu/engineering/nano/

Absolute Pressure Sensor Model in CoventorWare

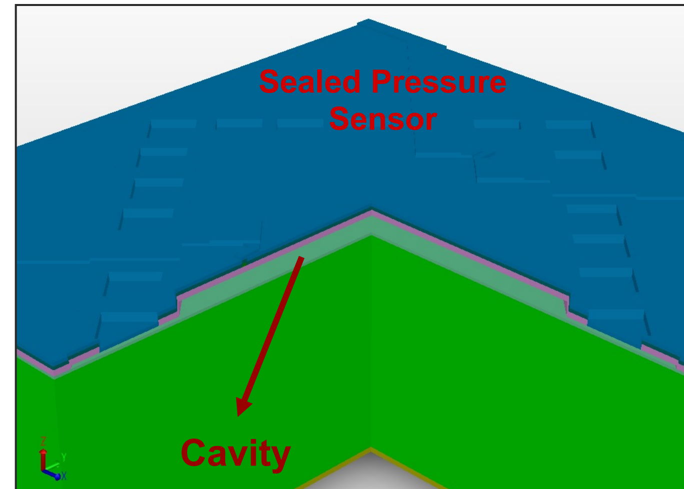
Flexible superstrate

0.14cm x 0.14cm

Wheatstone Bridge Configuration

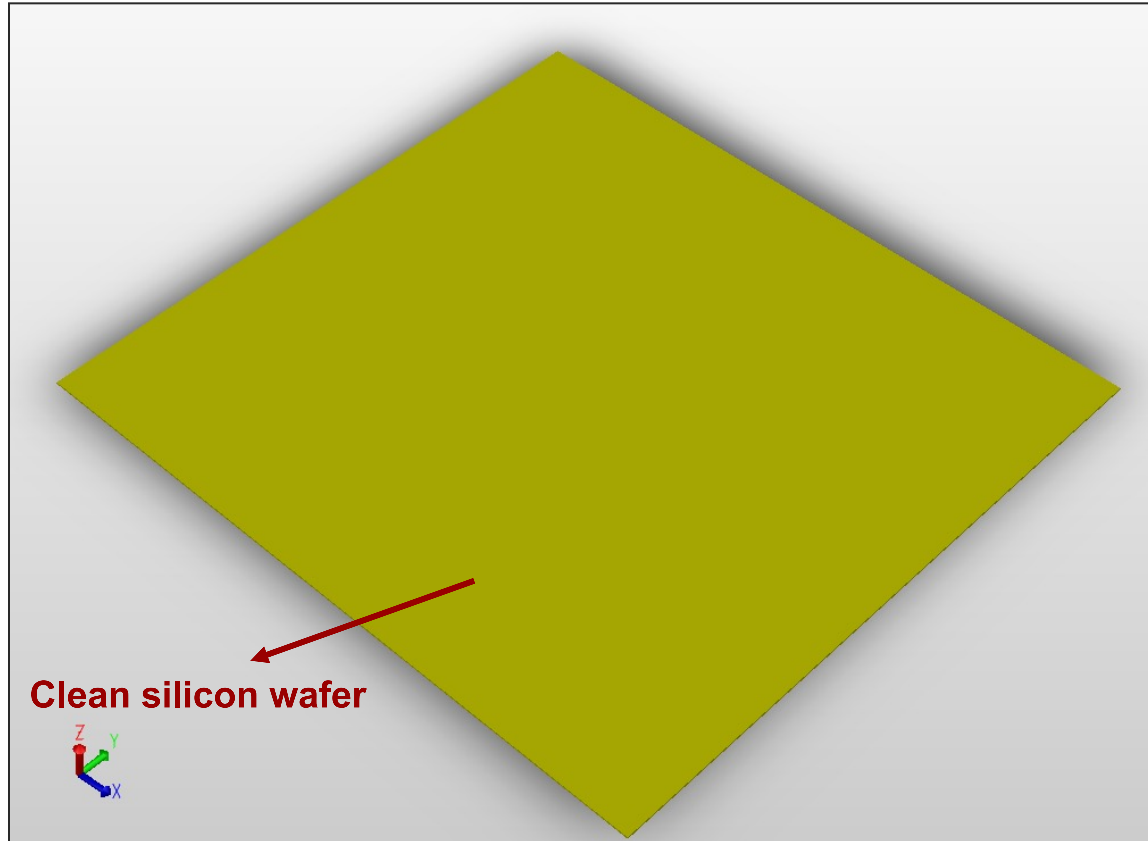
Flexible substrate

Bond Pads



Stress, Strain and Displacement simulations for the pressure sensor is currently on-going

Fabrication Process Flow for the Absolute Pressure Sensor



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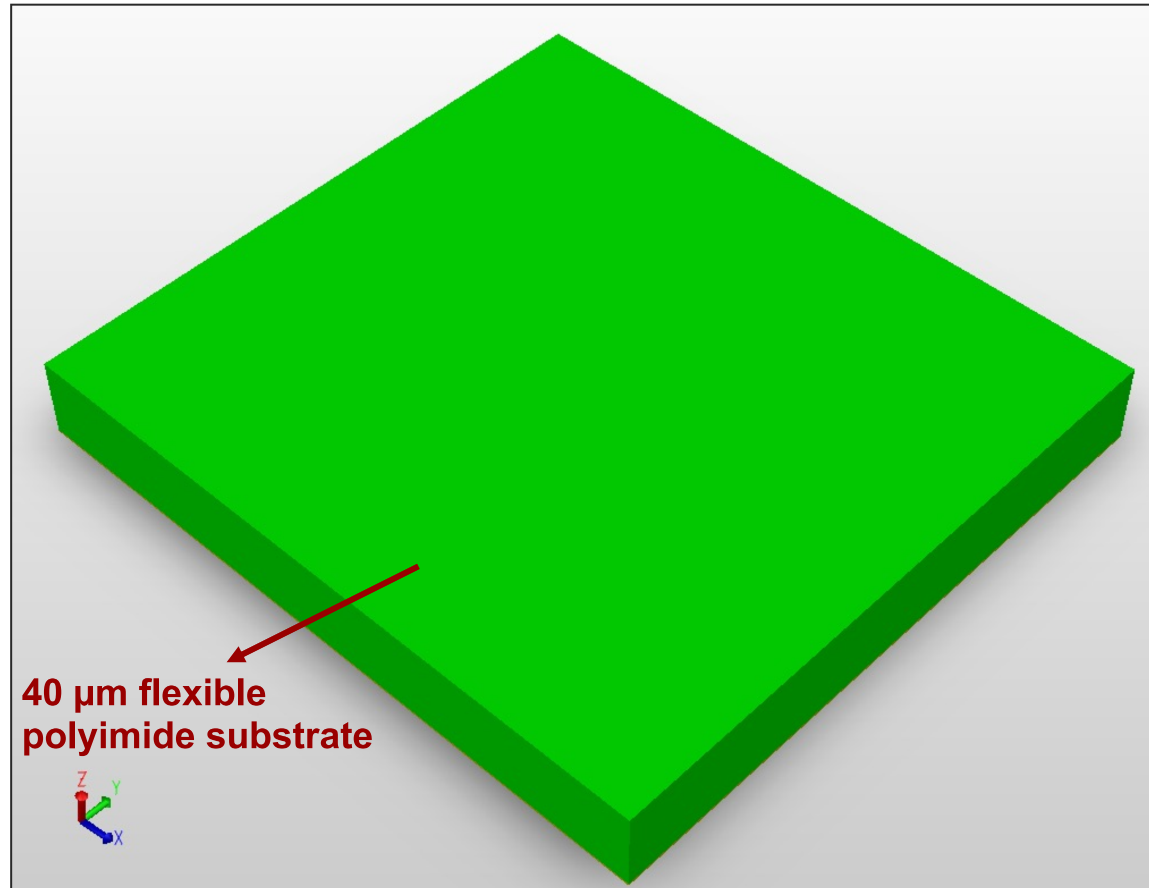

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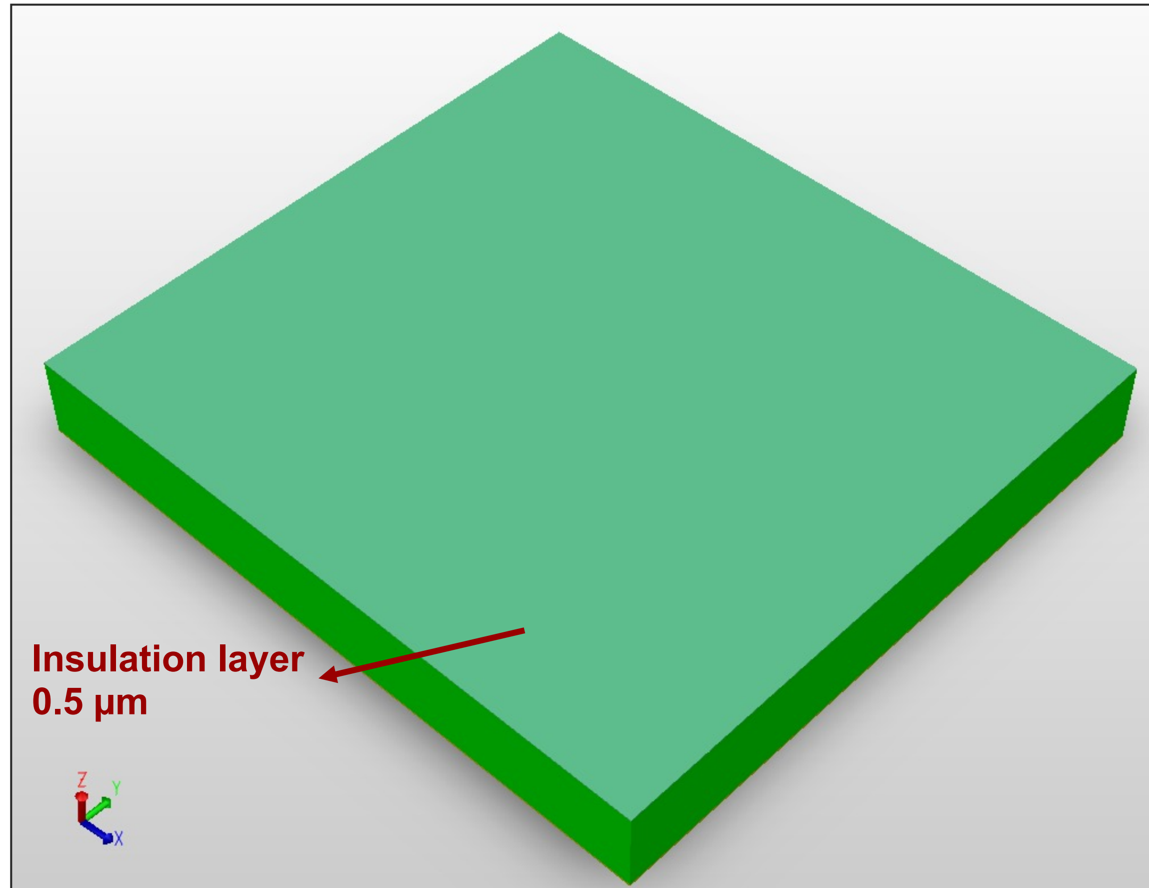

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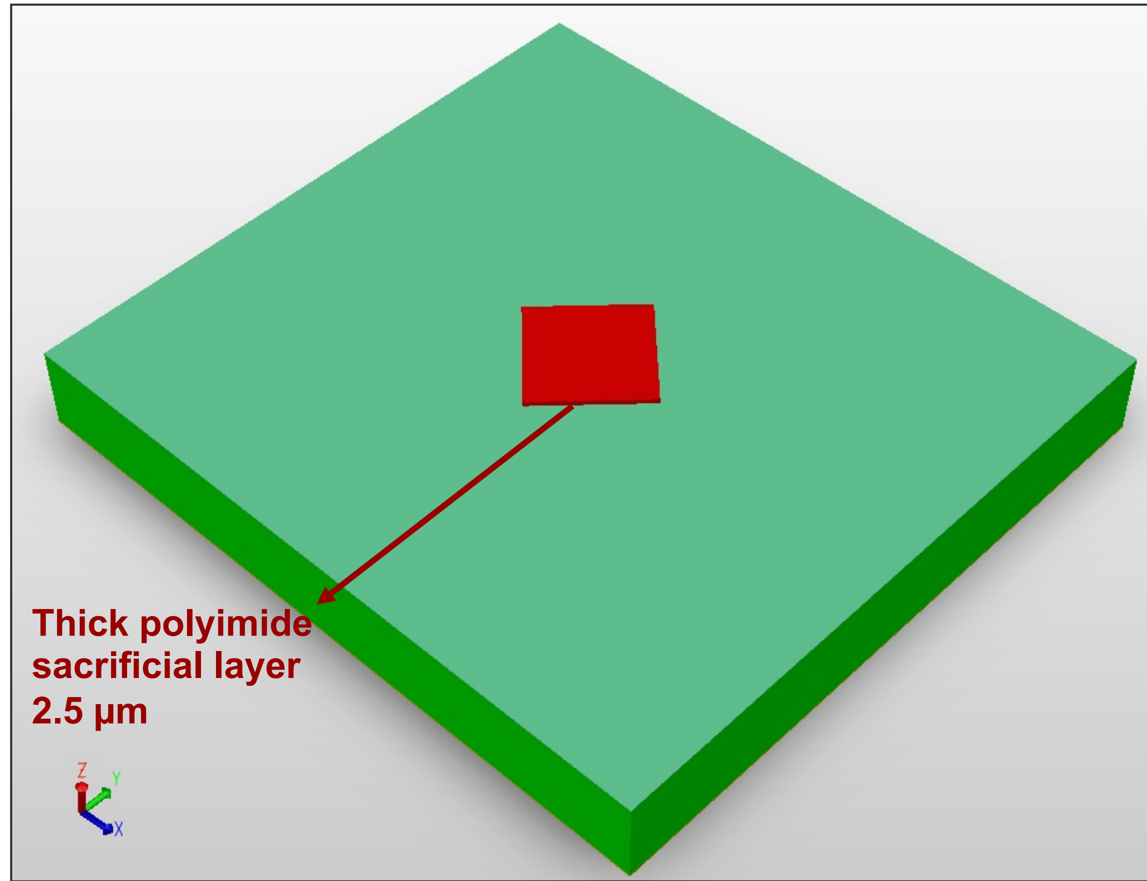

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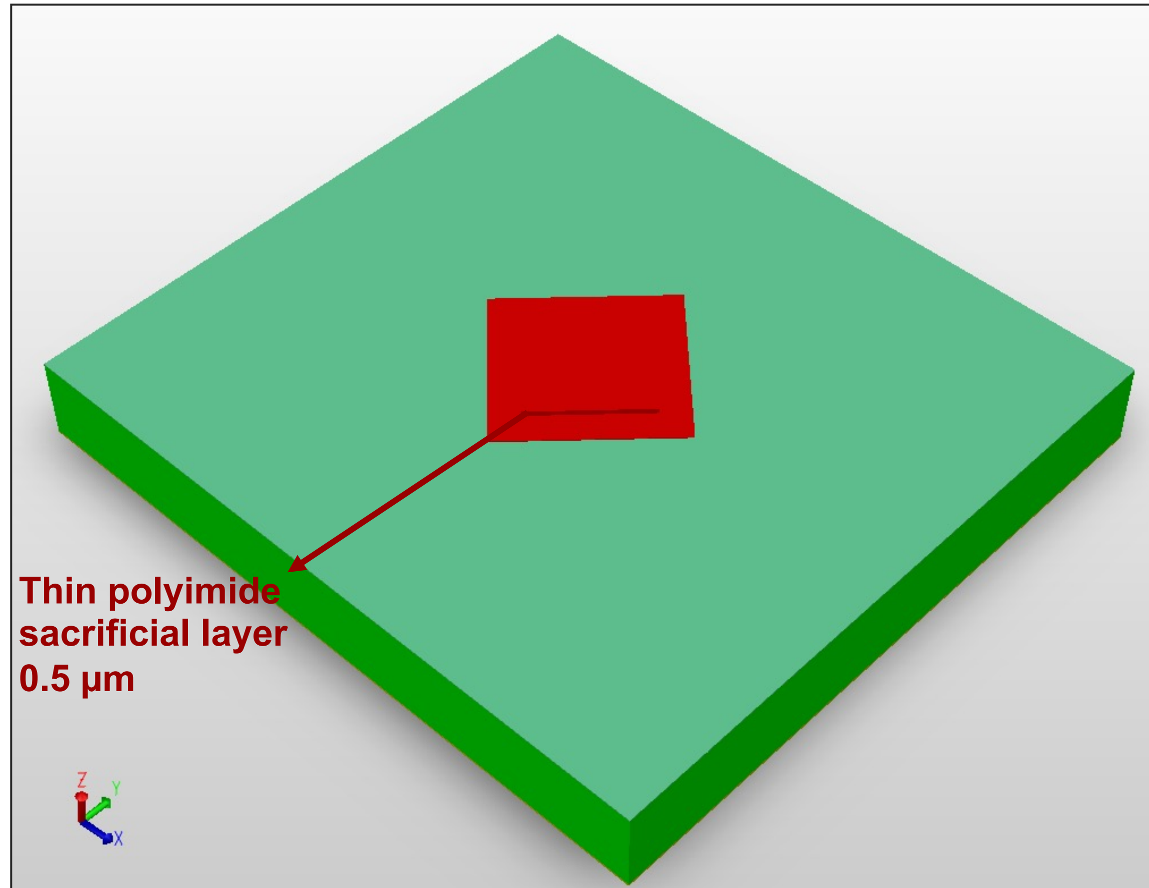

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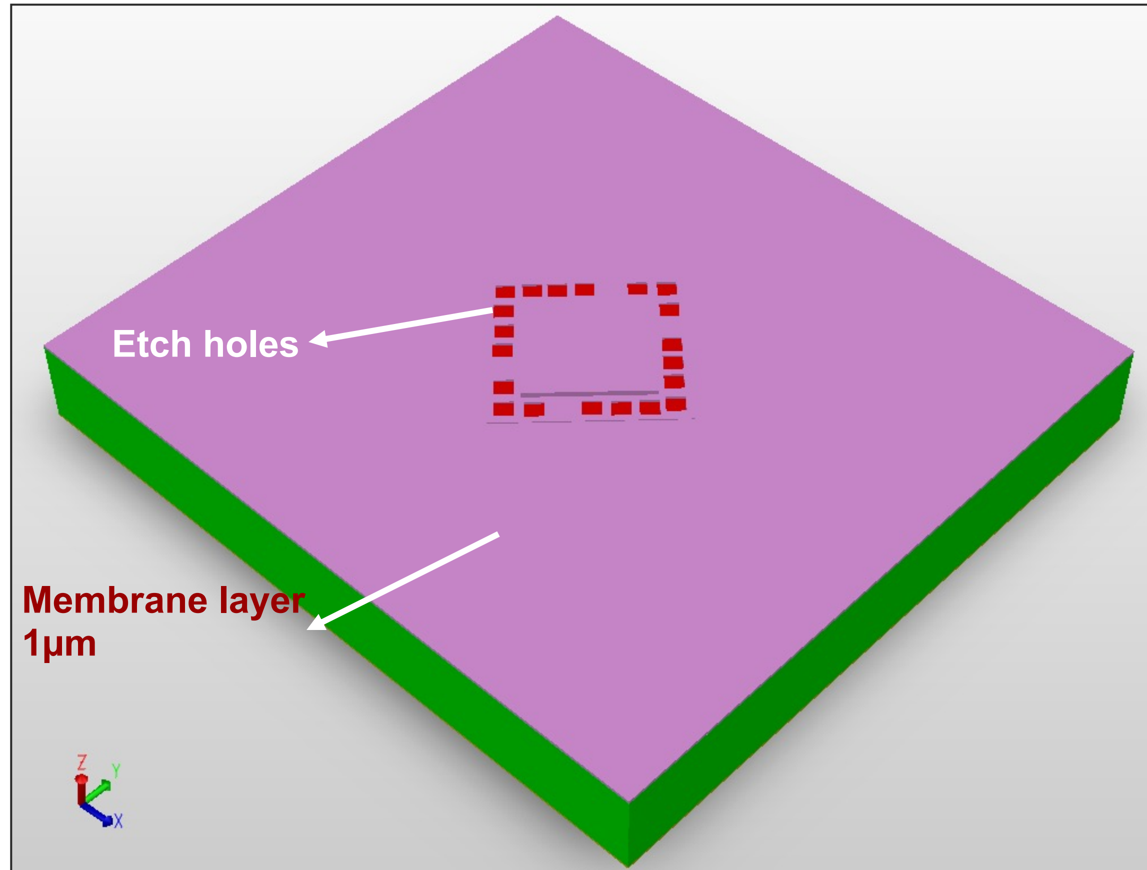

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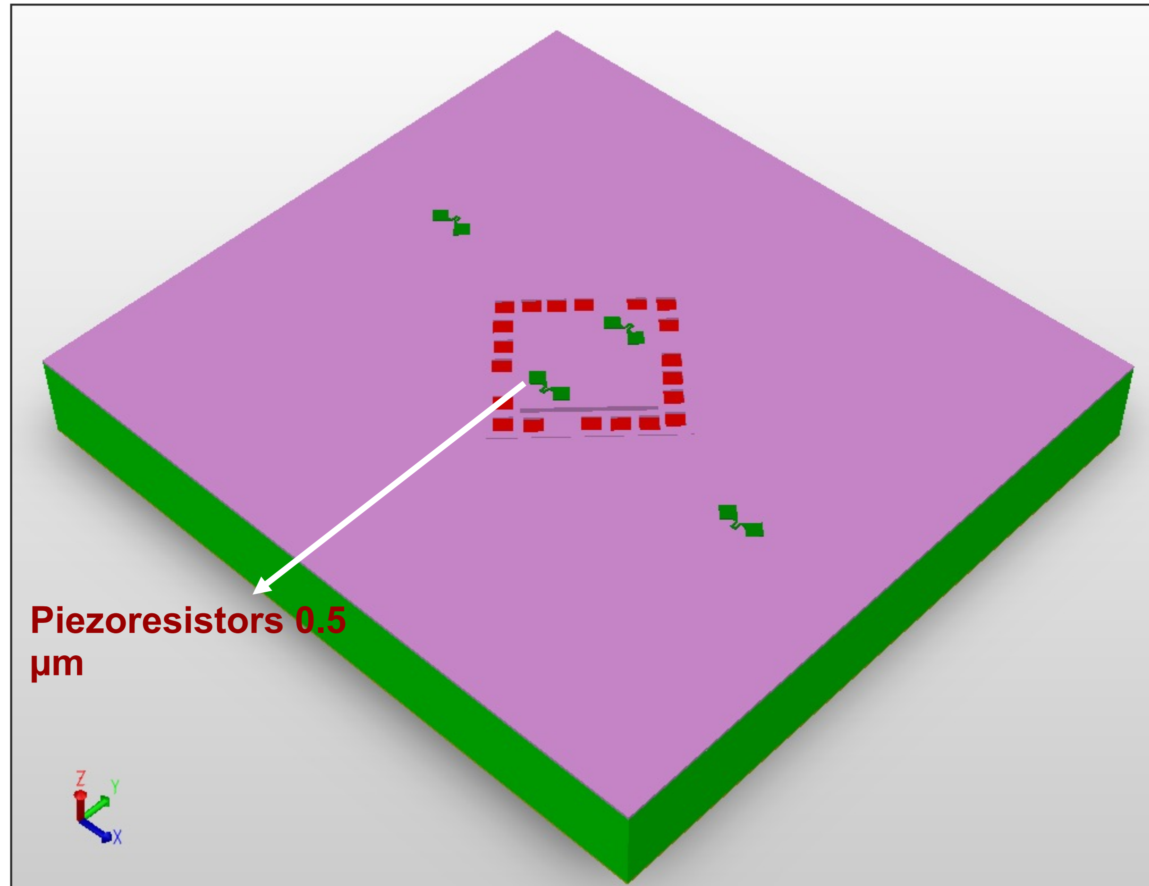

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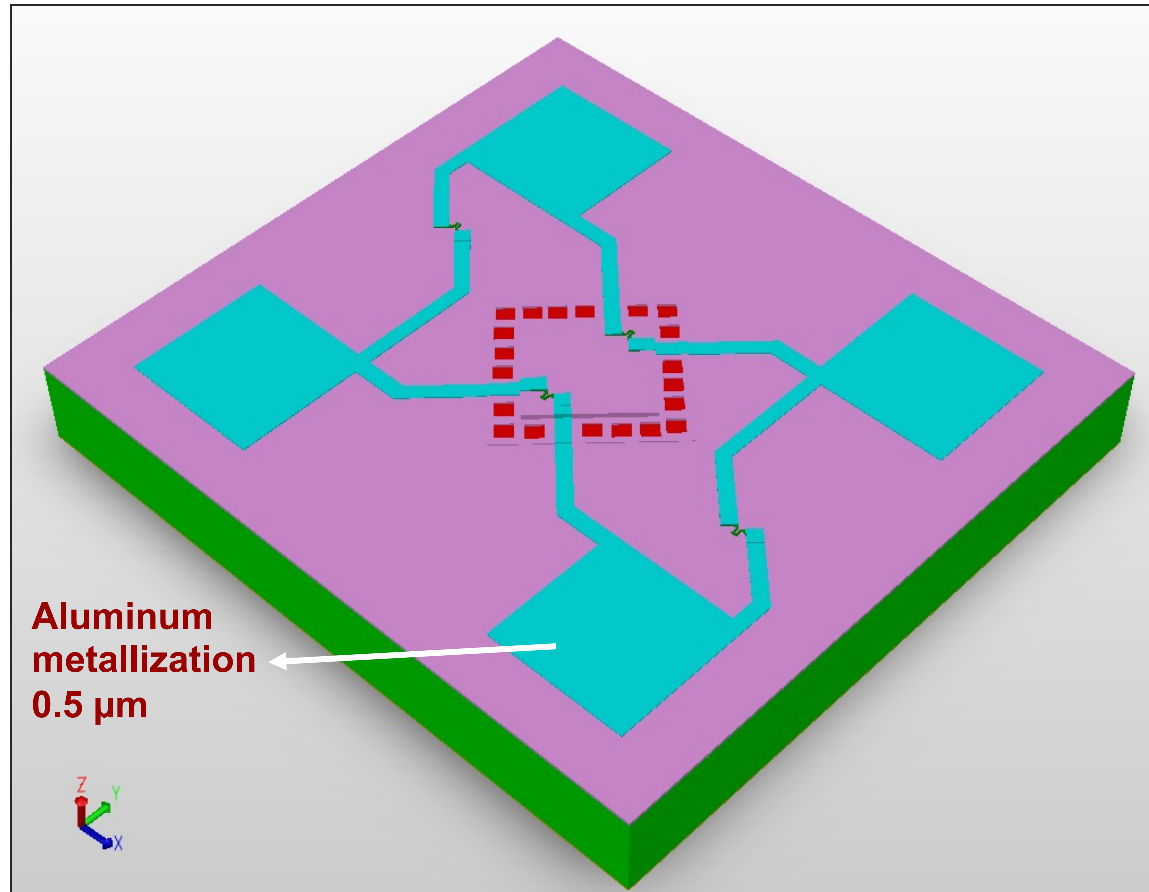

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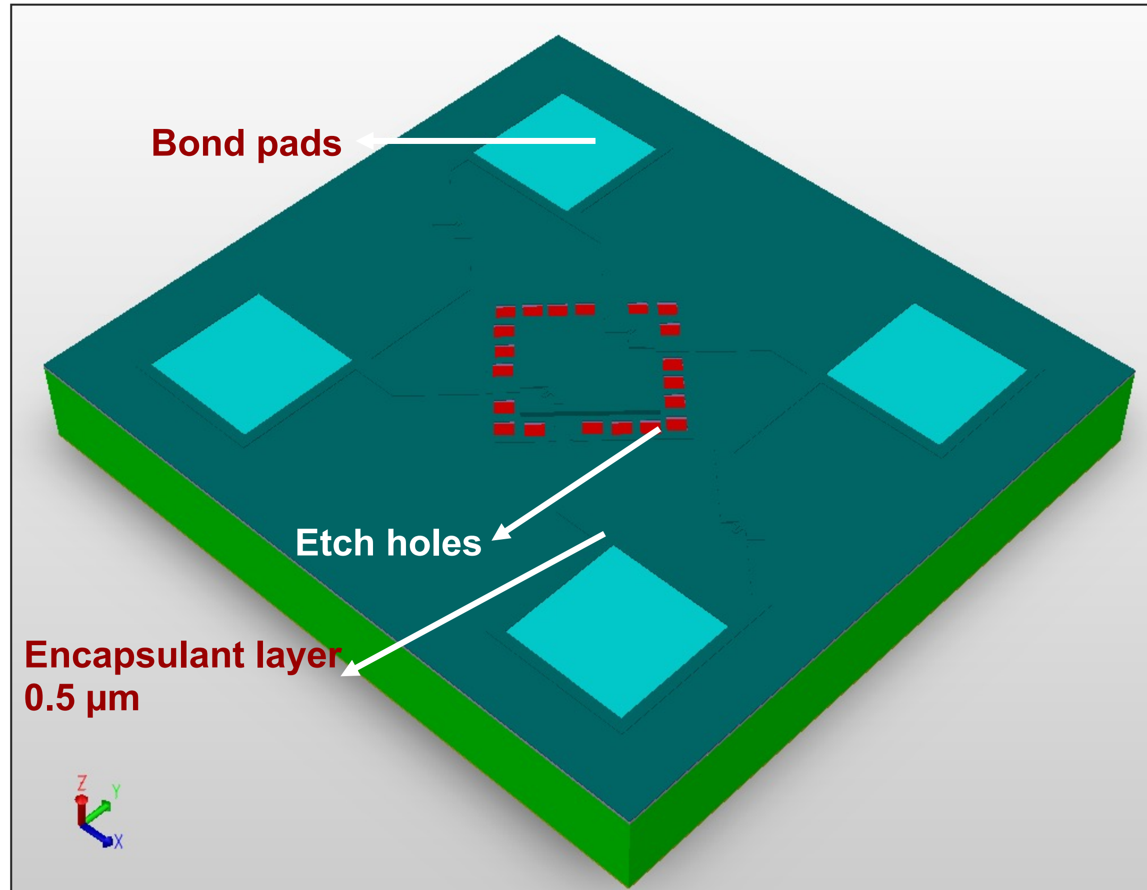

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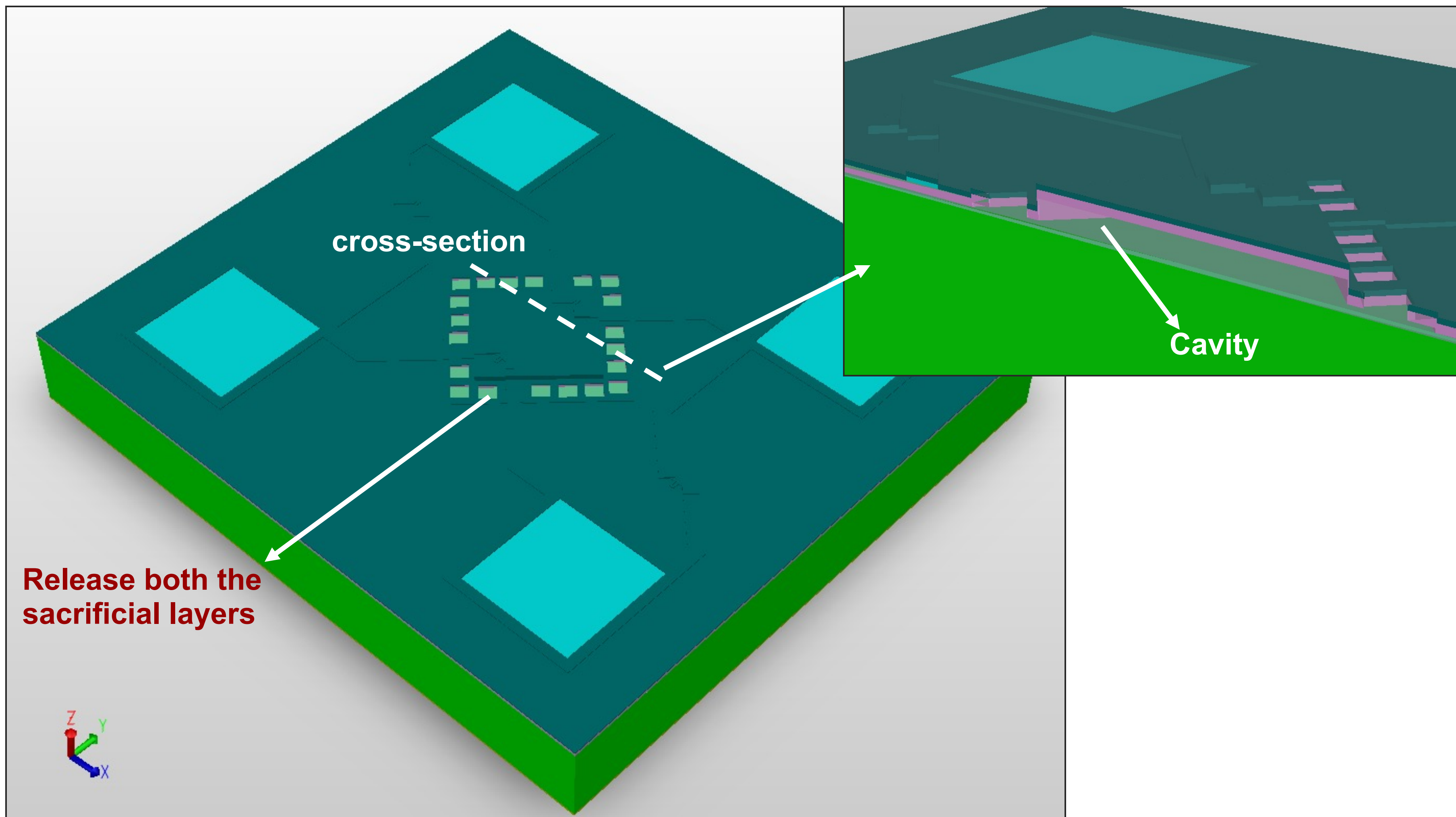

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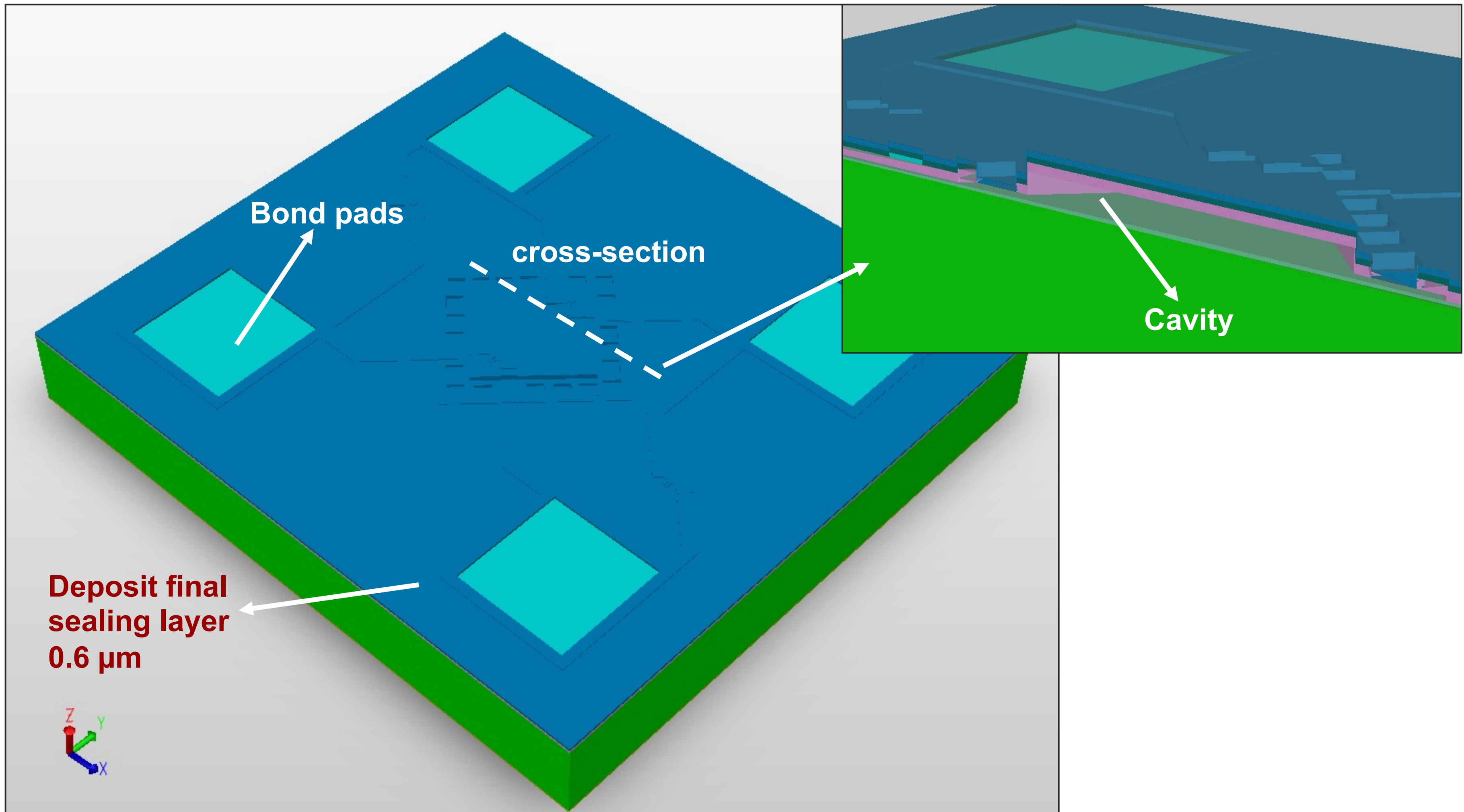

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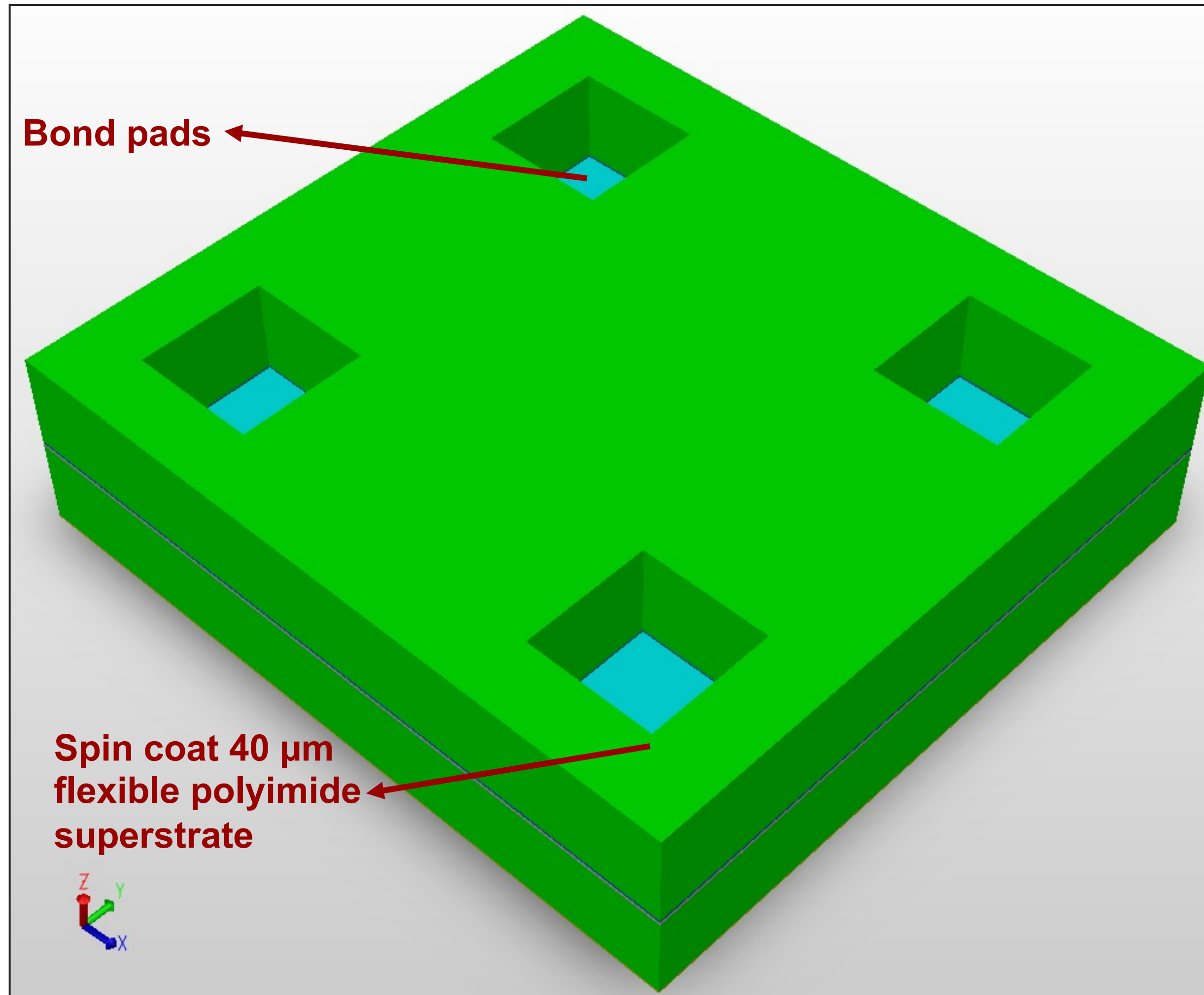
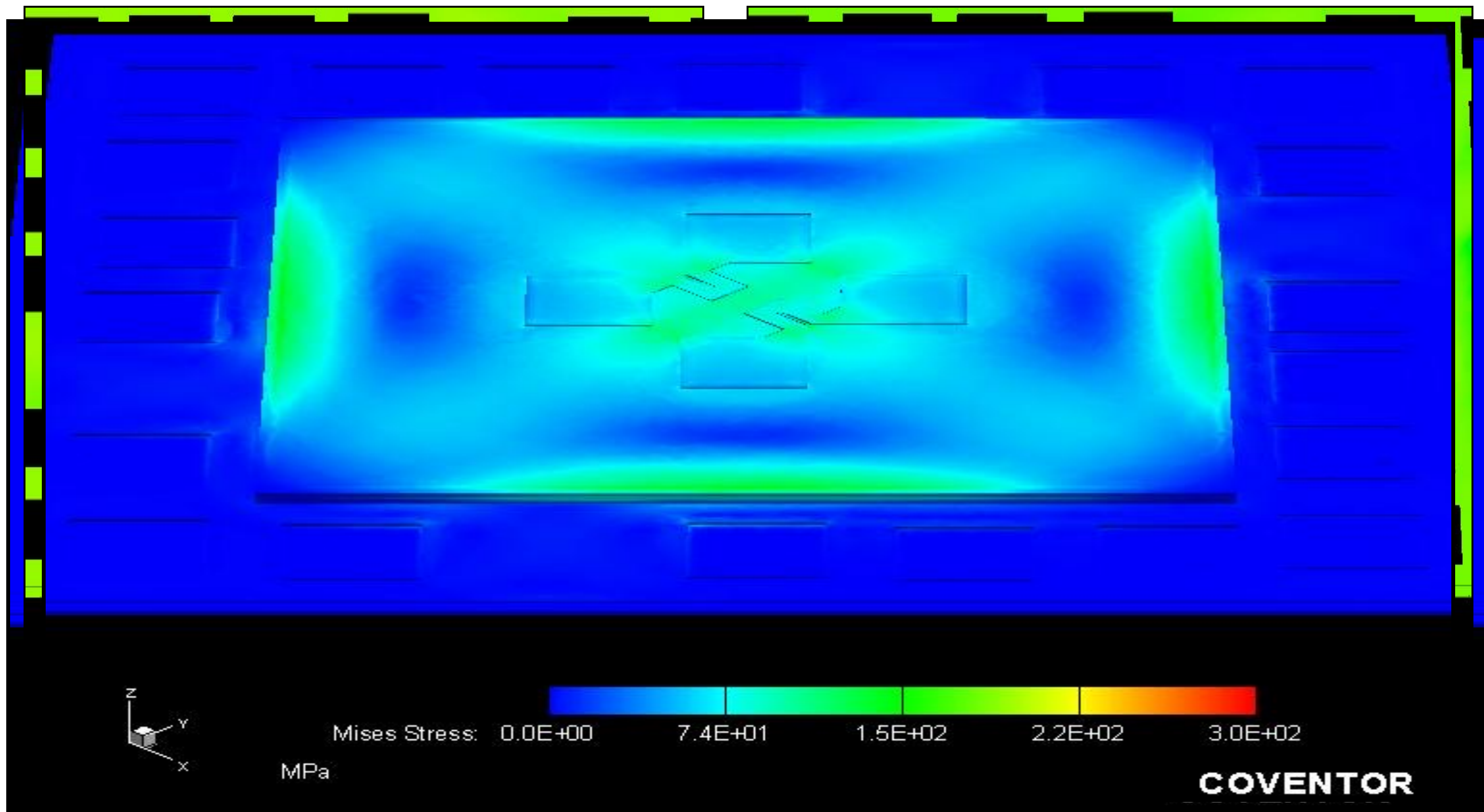


Absolute Pressure Sensor Results

Sensor A (0.0 – 2.0 psi)

DISPLACEMENT PLOT

STRAIN YY PLOT | MISES STRESS PLOT | STRAIN XX PLOT



Absolute Pressure Sensor Design

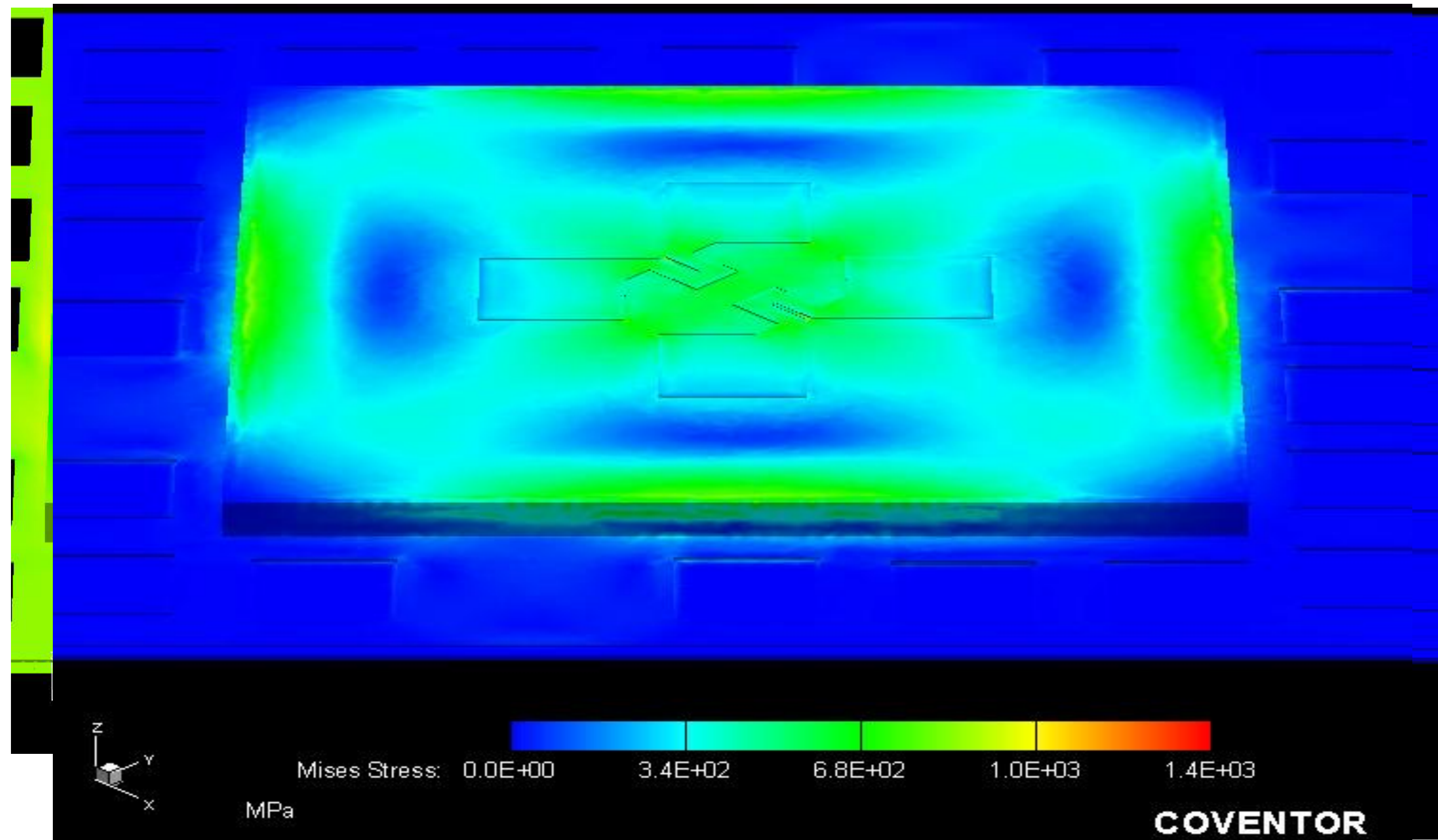
Sensor H (14.0 – 16.0 psi)

DISPLACEMENT PLOT

STRAIN YY PLOT

MISES STRESS PLOT

STRAIN XX PLOT



Absolute Pressure Sensor Fabrication Steps

STEP 1

- On a clean wafer spin-coat ~ 40 µm flexible polyimide as the substrate layer followed by 600 nm passivation layer

STEP 2

- Spin coat thick polyimide and cure

STEP 3

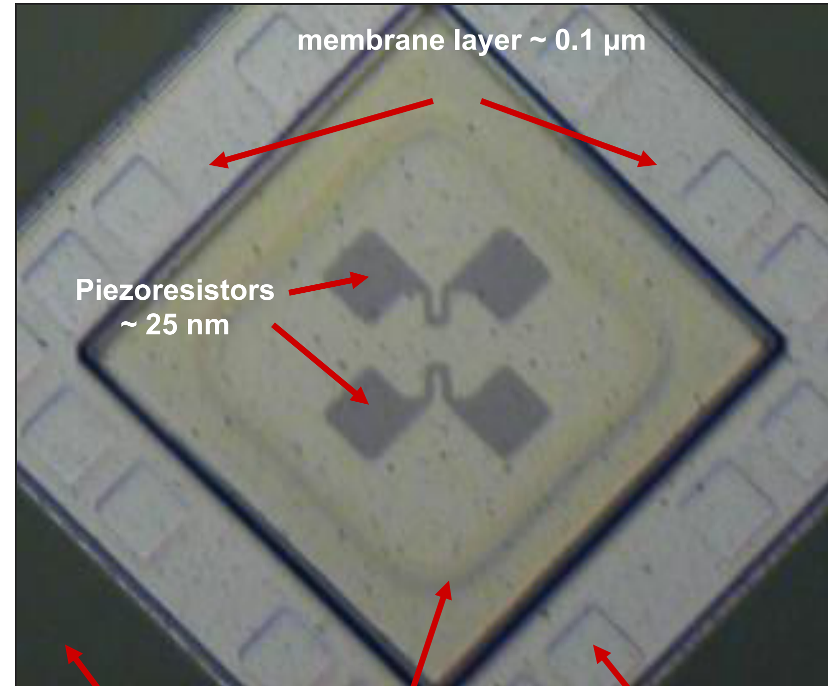
- Spin coat thin polyimide and cure

STEP 4

- Deposit 0.1 µm membrane layer

STEP 5

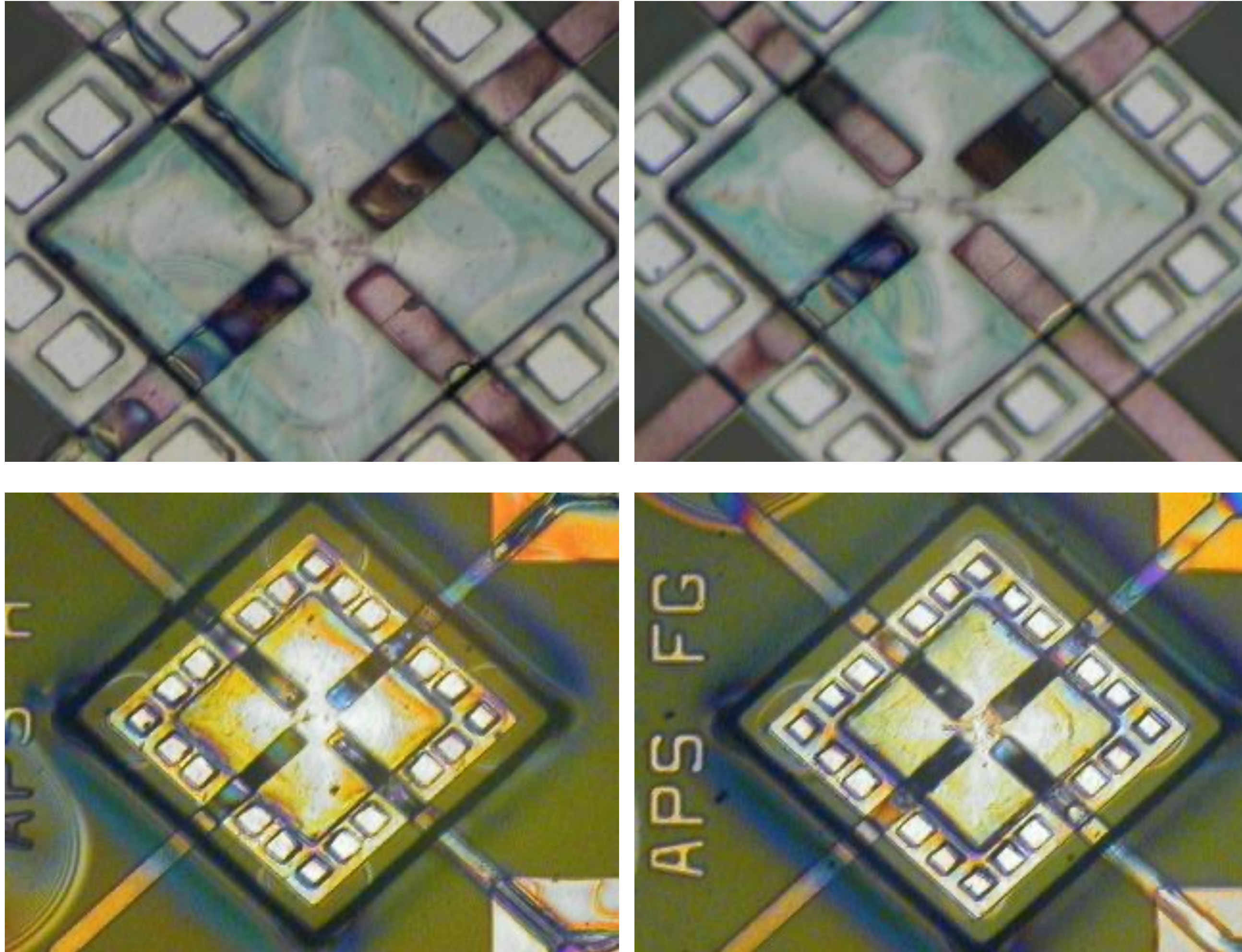
- Deposit ~ 25 nm piezoresistor layer



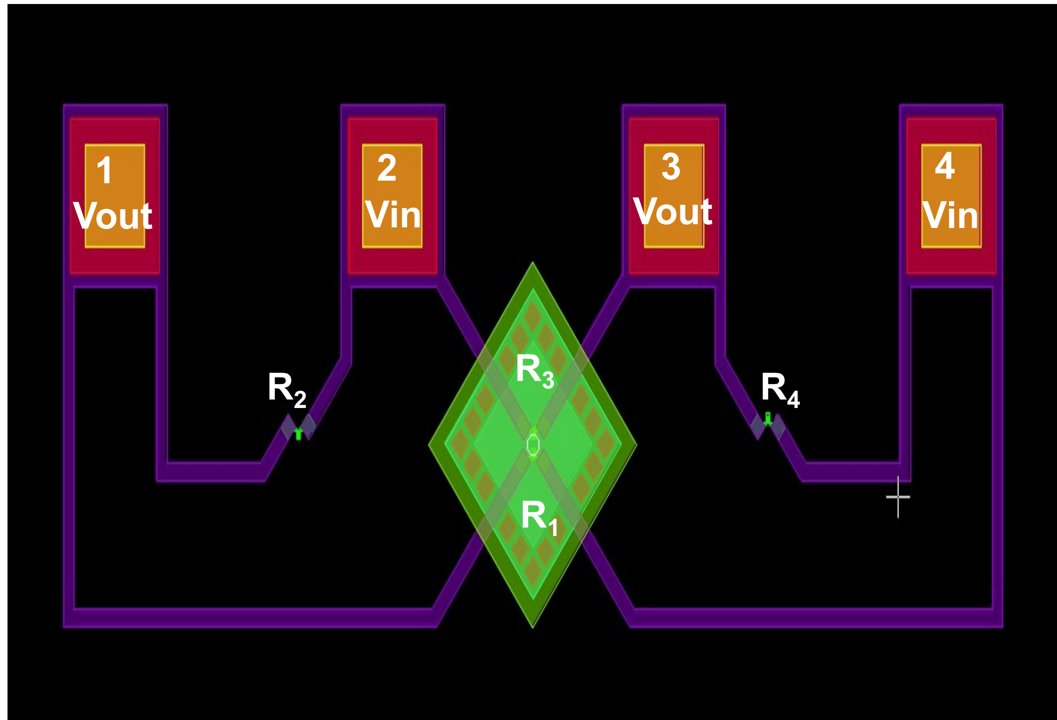
NEXT STEPS

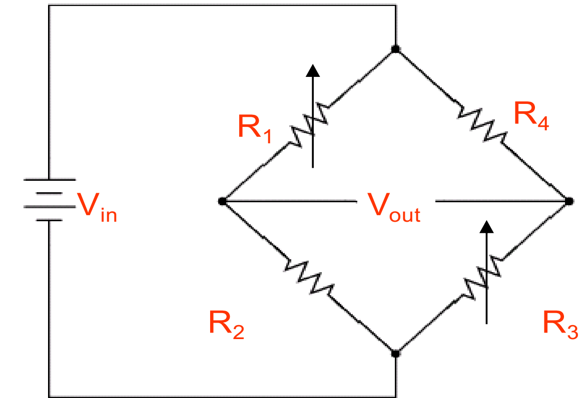
- Deposit ~ 500 nm thick aluminum as the metallization layer
- Ash the sacrificial layer using oxygen plasma to suspend the membrane
- Deposit 0.5 µm encapsulation layer followed by 0.5 µm as the final sealing layer
- Etch the silicon wafer from the back side to get access to the bond pads and characterize the absolute pressure sensors

Absolute Pressure Sensor Fabrication Steps



Absolute Pressure Sensor Characterization





- The electrical circuit is complete with two active piezoresistors (R_1 and R_3) and two passive piezoresistors (R_2 and R_4) in a Wheatstone bridge configuration
- The current-voltage characteristics is plotted and the true resistances are found
- Pressure is applied on top of the membrane and the change in output voltage vs. input voltage is plotted