

# Temperature Sensors on Flexible Substrates

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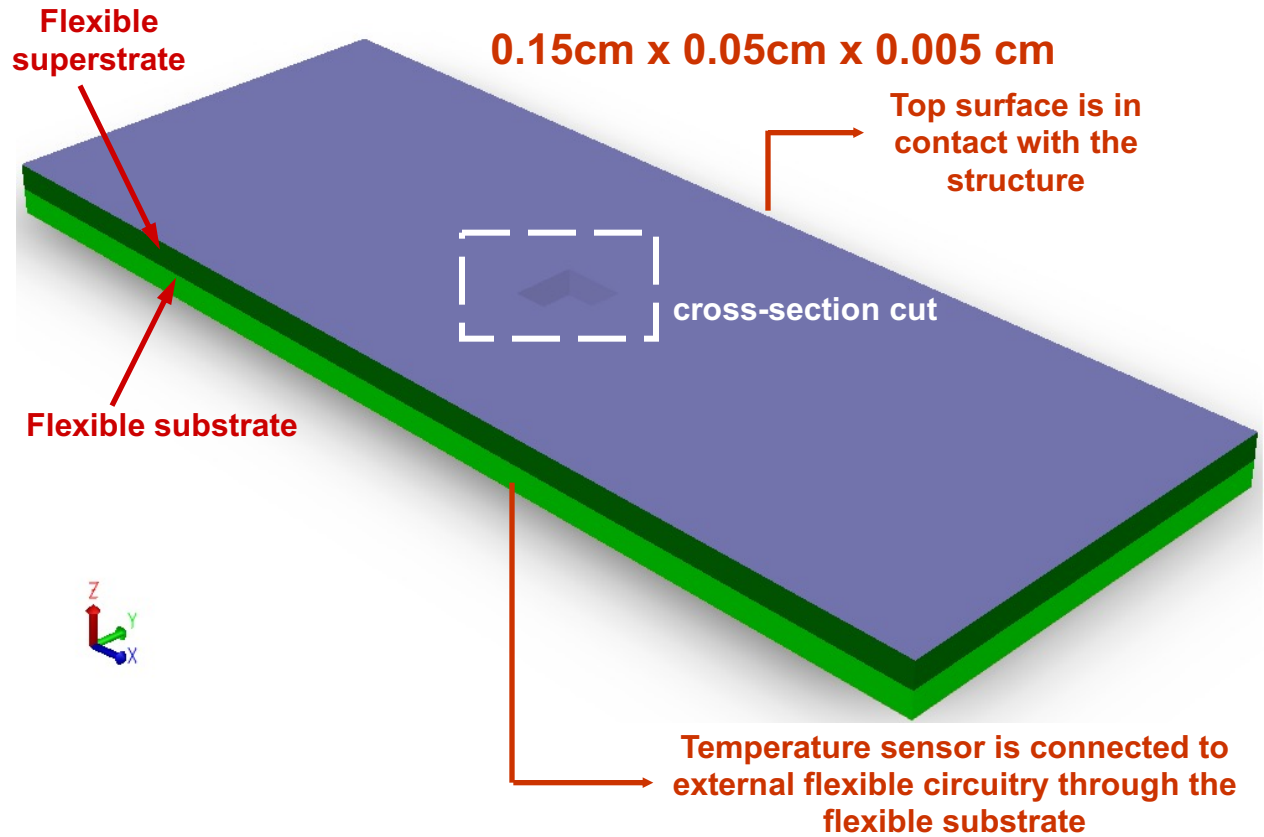
*Nanotechnology Research and Teaching Facility  
University of Texas at Arlington*

<http://www.uta.edu/engineering/nano/>

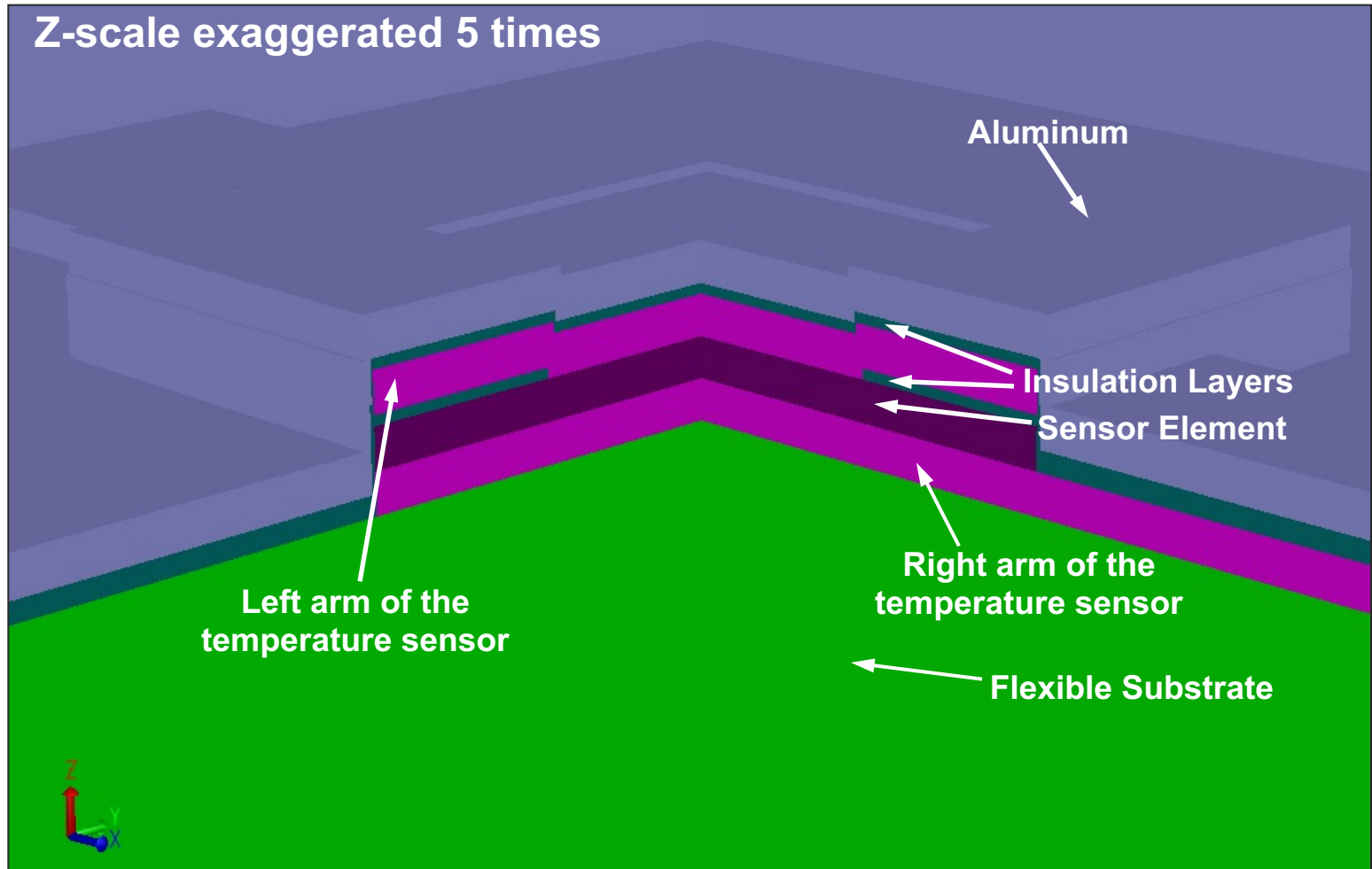
March 13, 2009

# Temperature Sensor

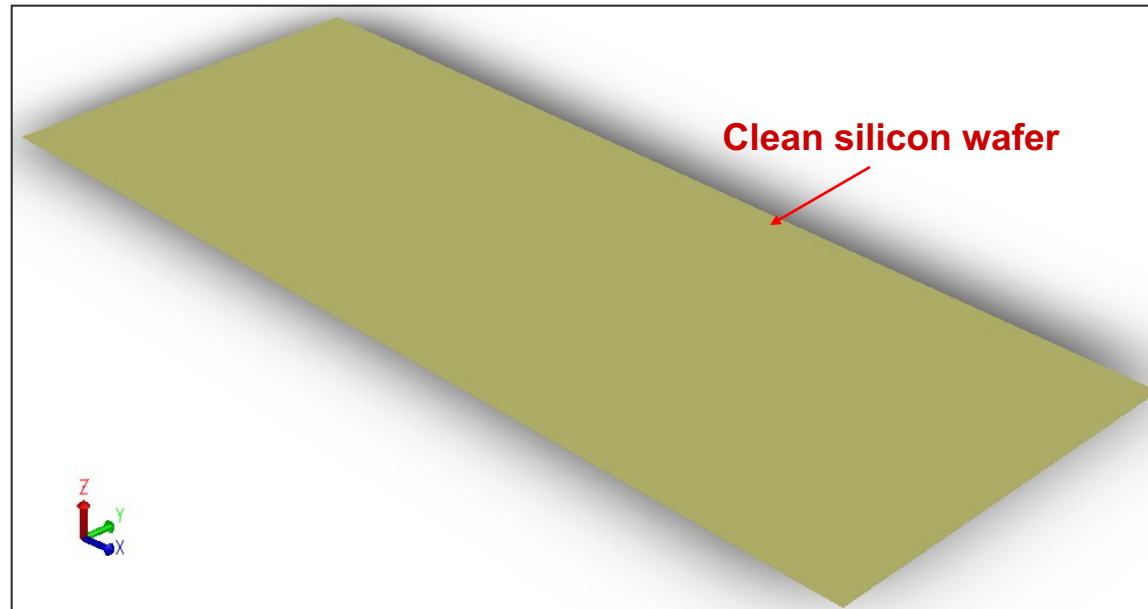
## Temperature Sensor - CoventorWare Model



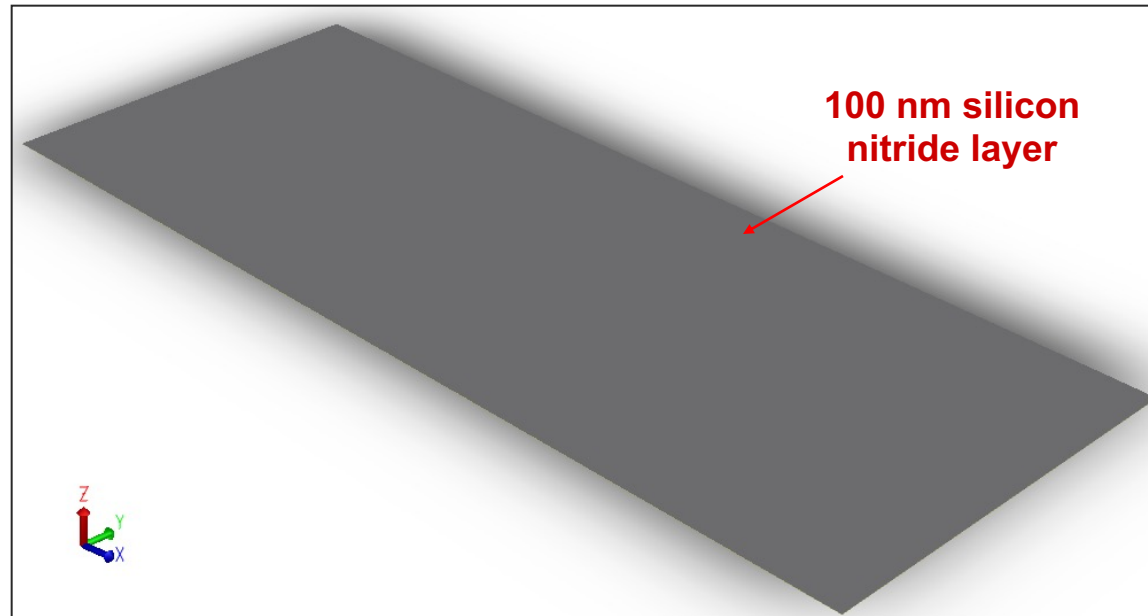
# Temperature Sensor



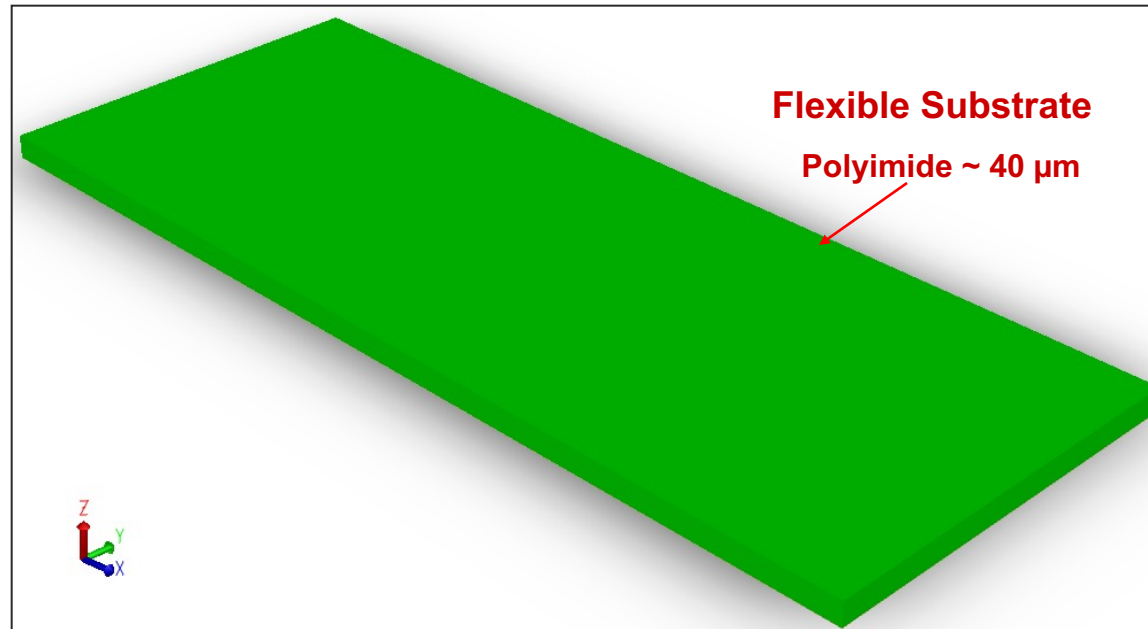
# Fabrication Process Flow for the Temperature Sensor



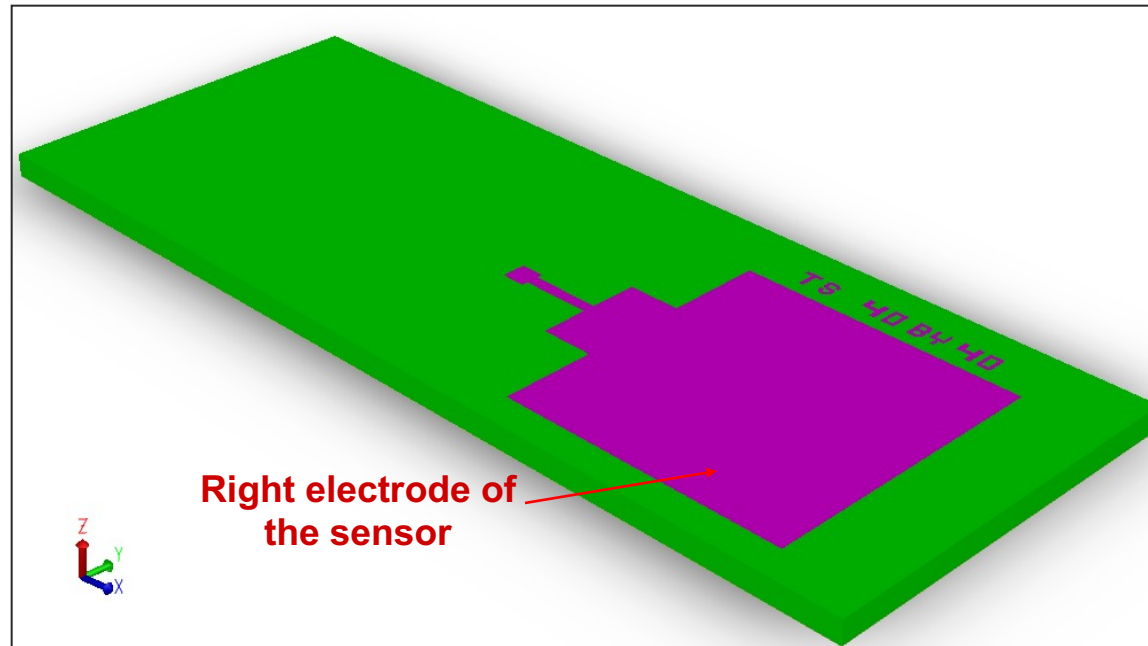
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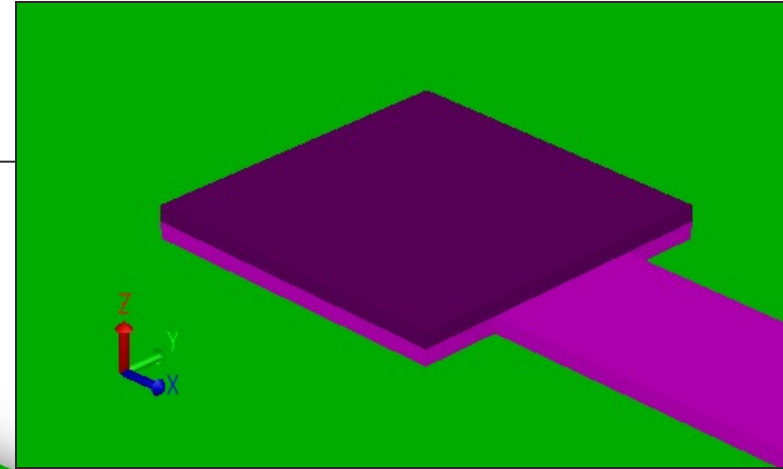
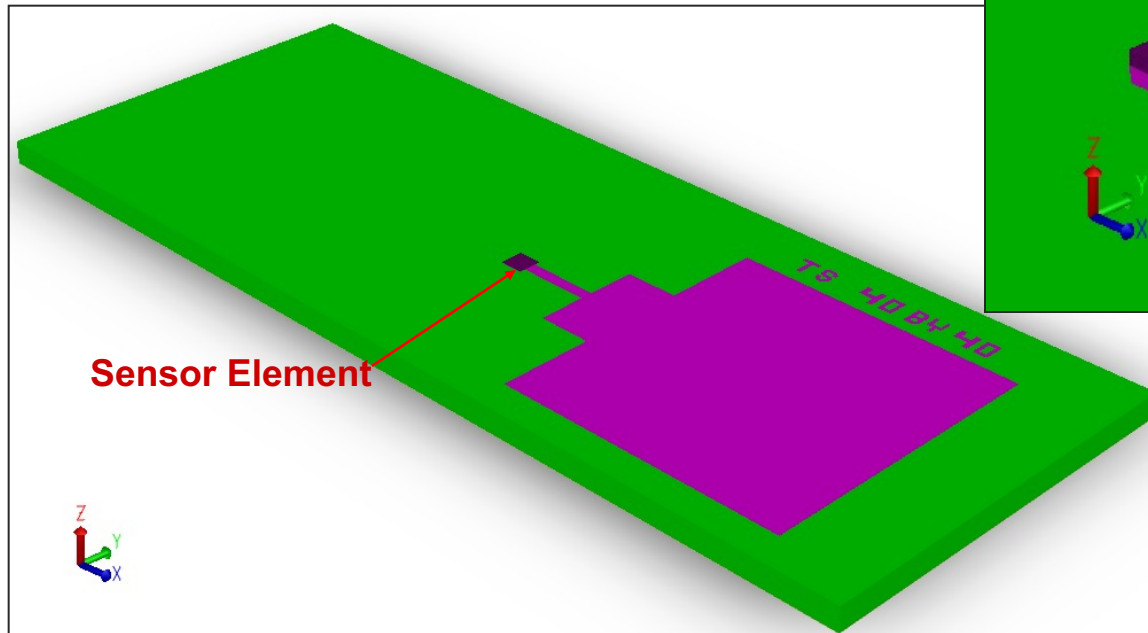
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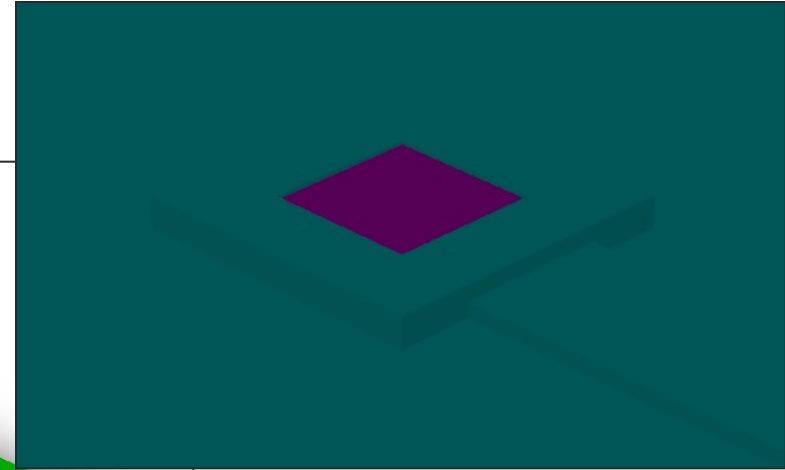
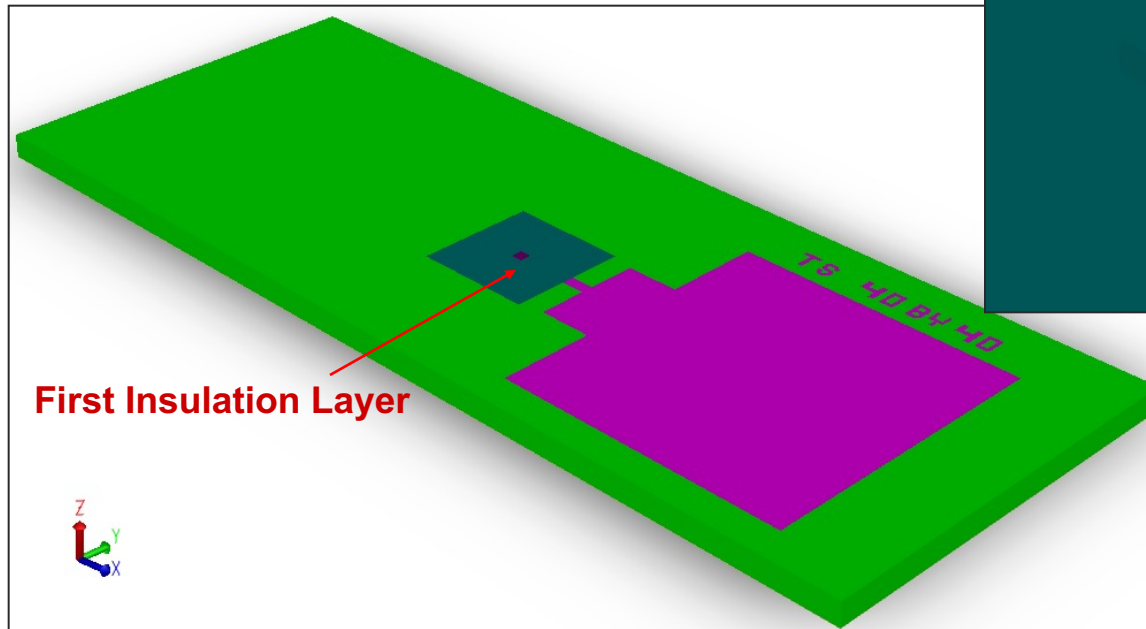


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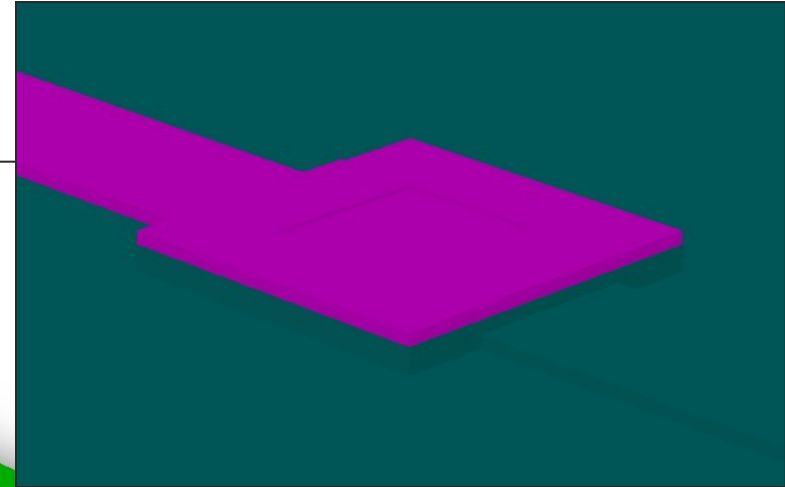
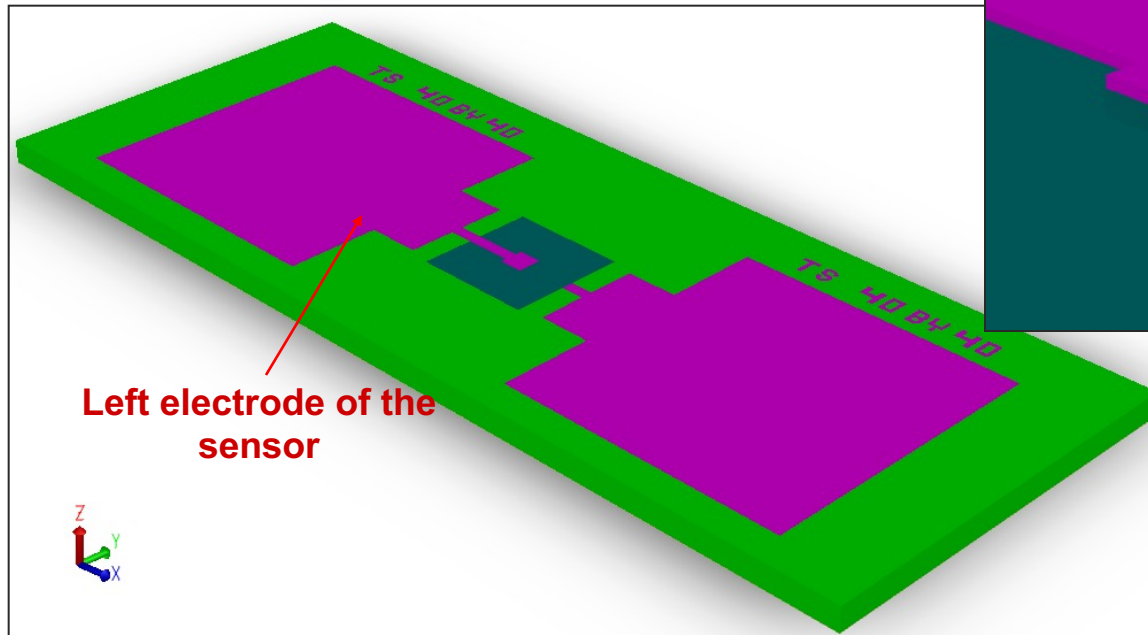




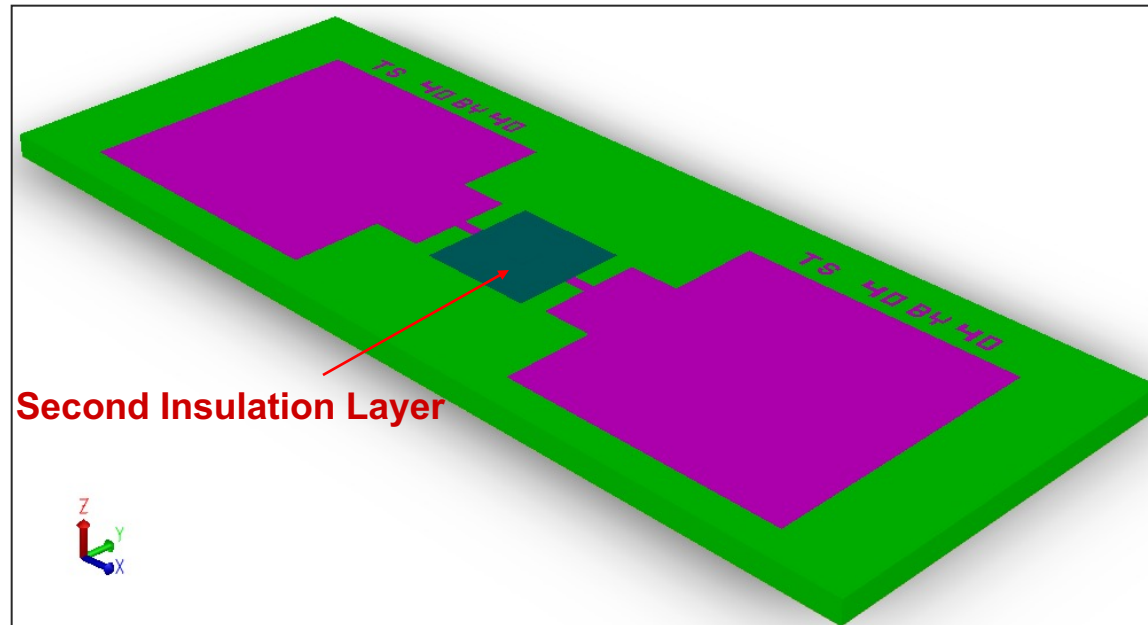
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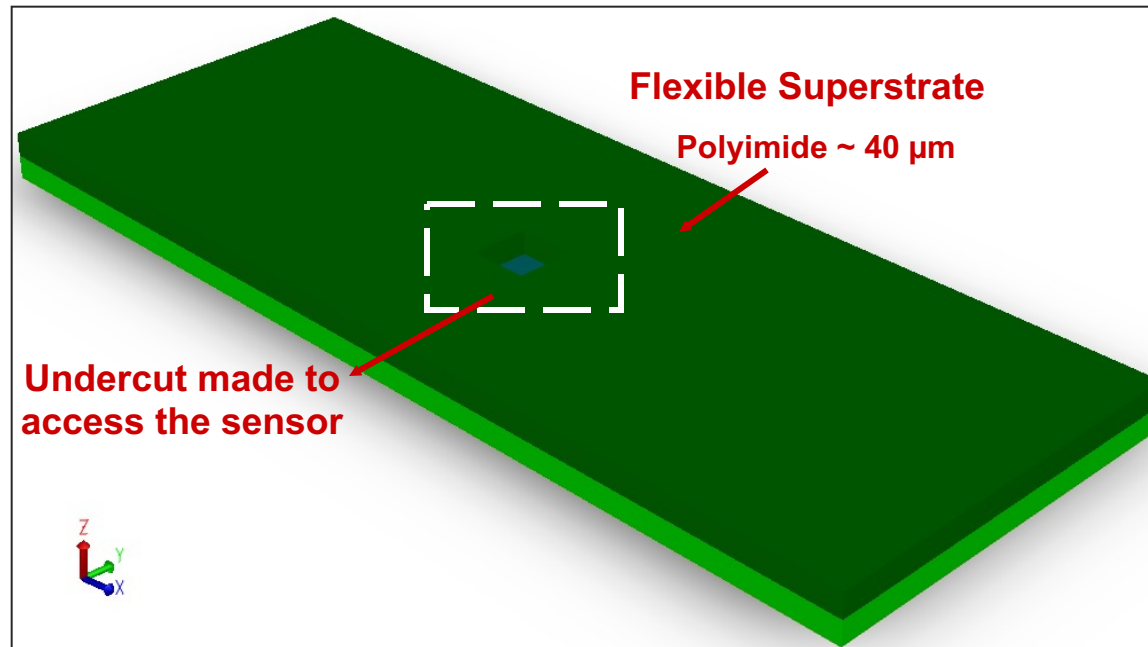


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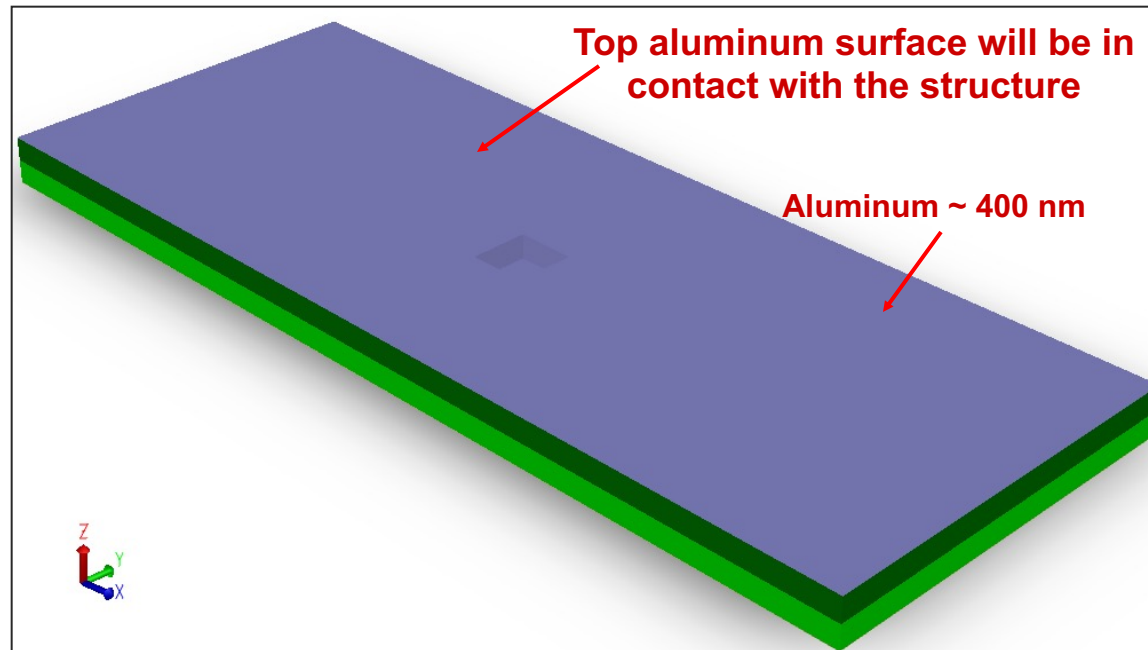


Second Insulation Layer

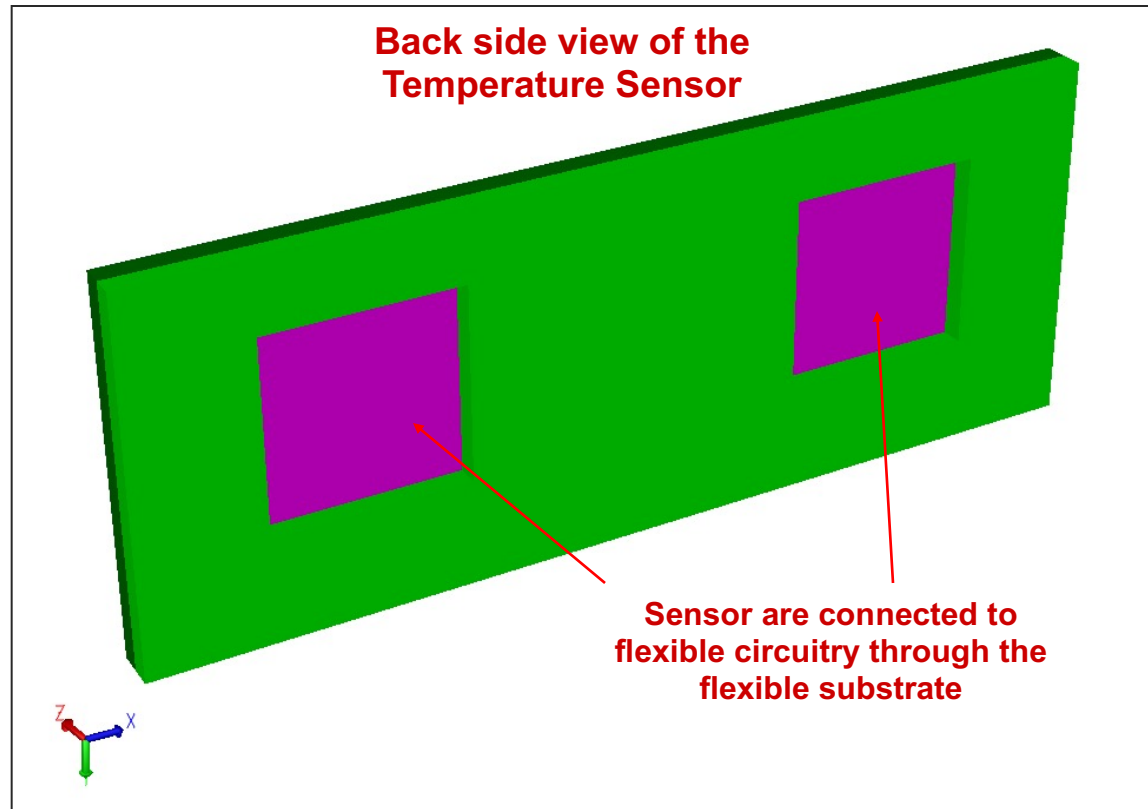
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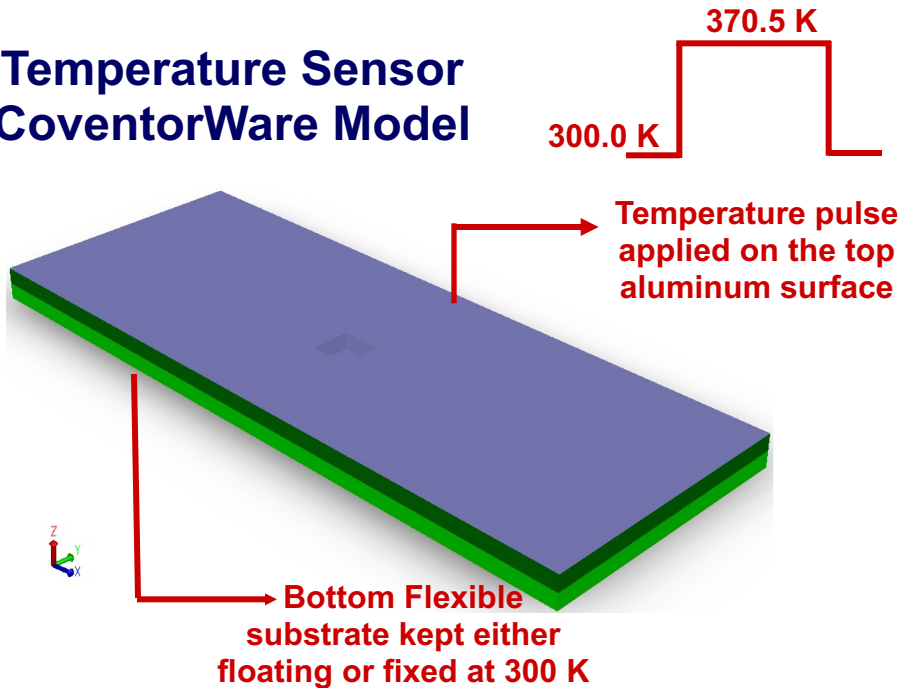


# Fabrication Process Flow for the Temperature Sensor

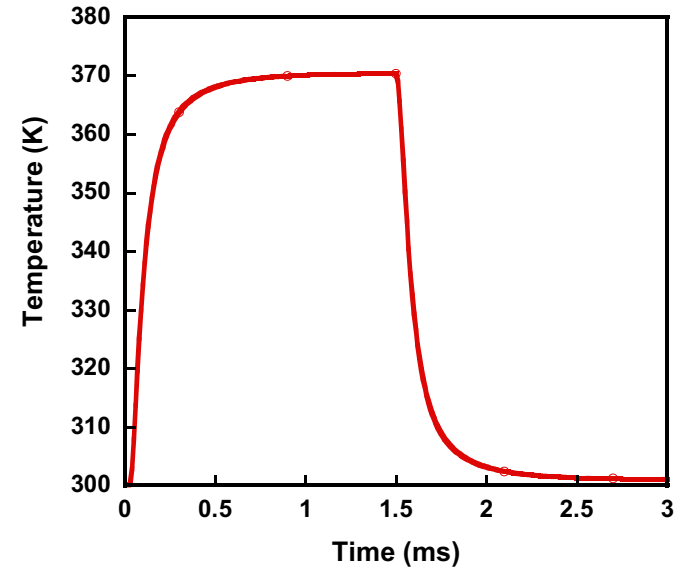


# Temperature Sensor Simulation Results

## Temperature Sensor CoventorWare Model



Thermal Transient Analysis of the Temperature Sensor



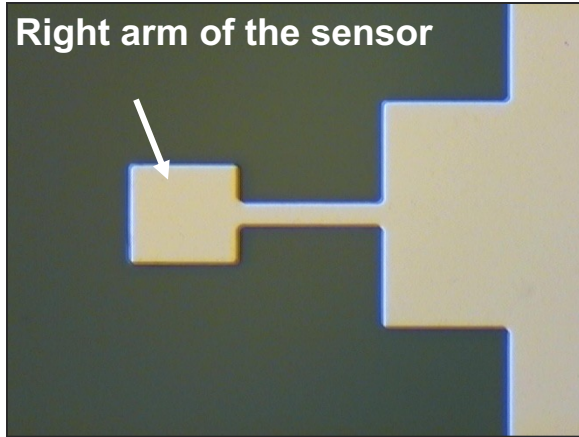
**Simulated, heating thermal time constant = 0.07 ms**  
**cooling thermal time constant = 0.67 ms**



# Temperature Sensor Fabrication

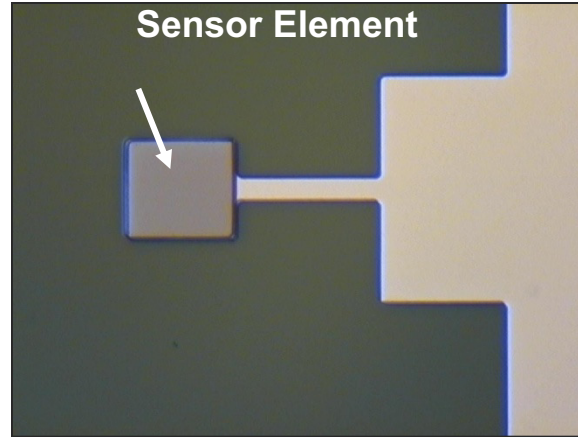
## STEP 1

Right arm of the sensor



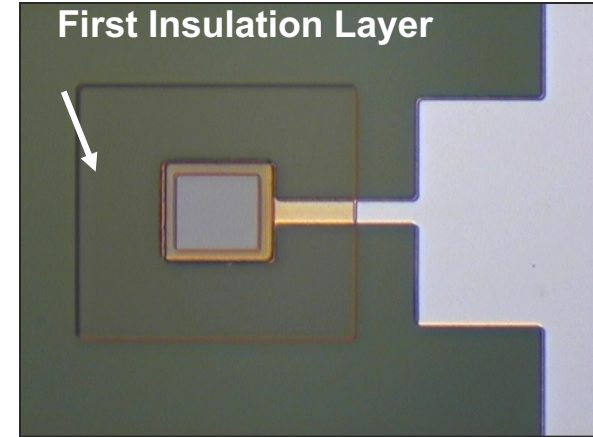
## STEP 2

Sensor Element



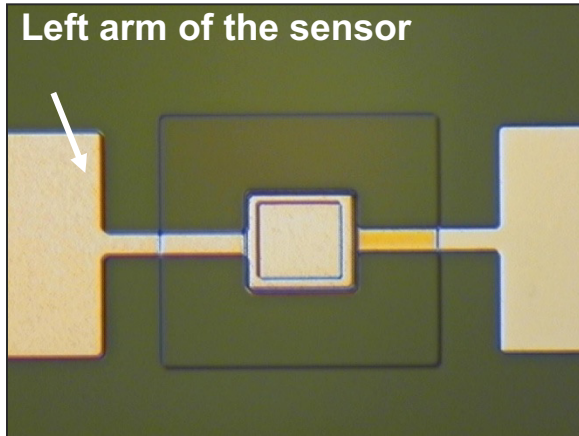
## STEP 3

First Insulation Layer



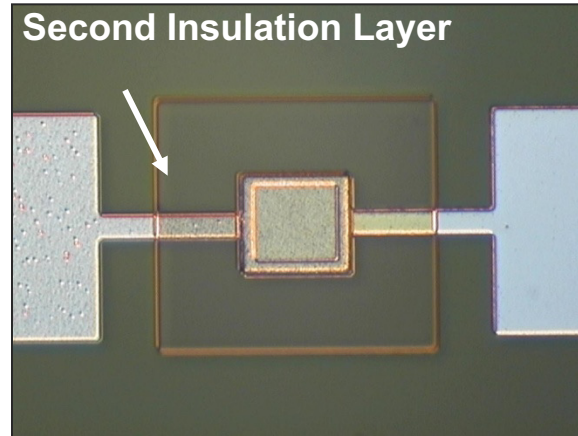
## STEP 4

Left arm of the sensor



## STEP 5

Second Insulation Layer



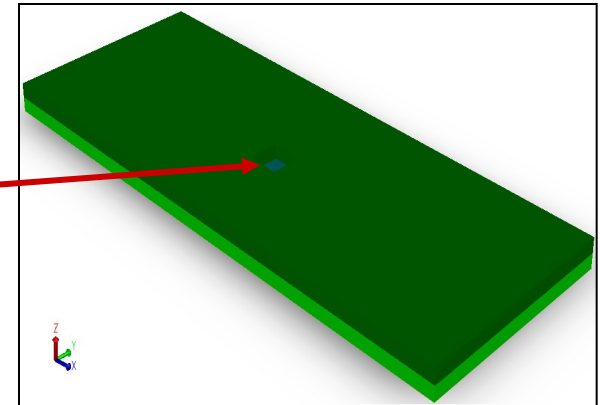
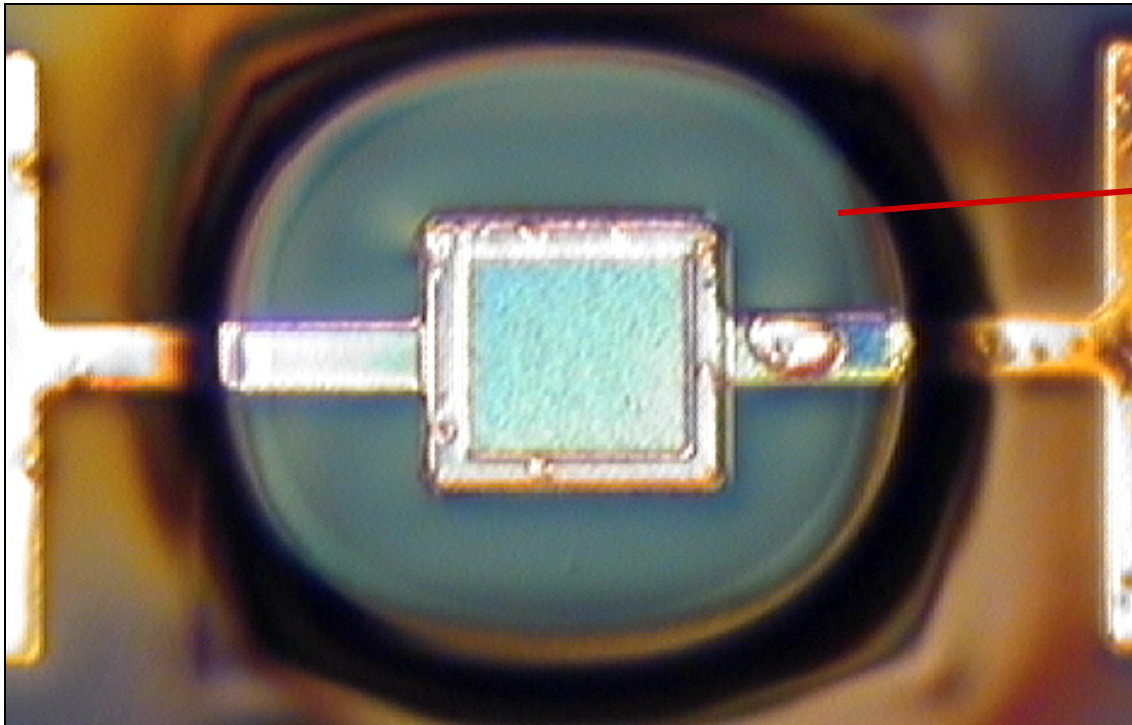
## STEP 6, 7, 8

- ❑ Spin-coat and pattern polyimide superstrate layer
- ❑ Deposit Aluminum layer
- ❑ Etch the back-side of the wafer and get access to bond-pads



# Temperature Sensor Fabrication

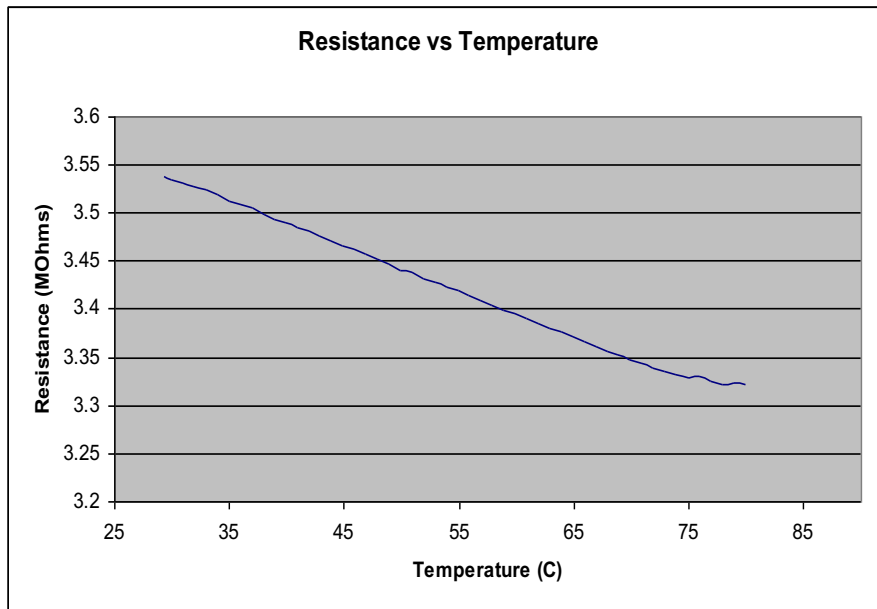
- Spin-coat and pattern polyimide superstrate layer



- Then deposited Aluminum on top of the superstrate layer to make contact with the structure

# Temperature Sensor Results

## TS 80x80 $\mu\text{m}$ Device 1



## TS 80x80 $\mu\text{m}$ Device 2

