

# Technology Background

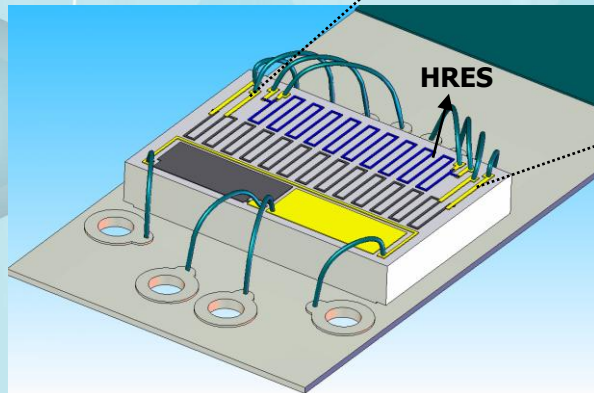
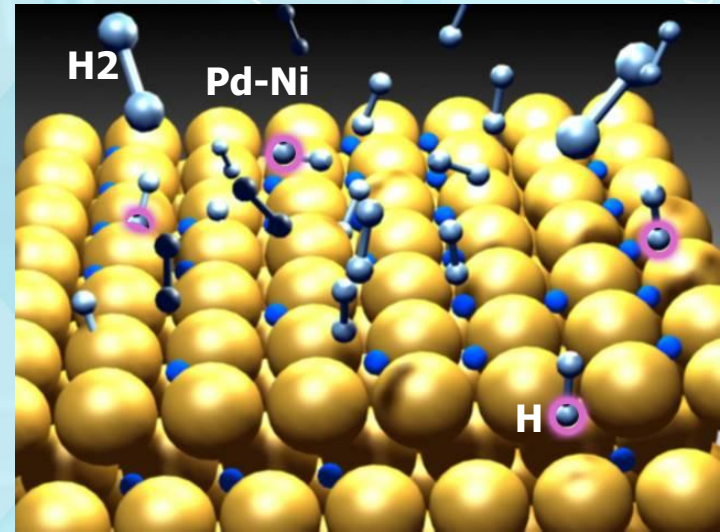
- Hydrogen specific solid-state sensing technology that has both resistor and capacitor circuits for H<sub>2</sub> measurement/detection from 15ppm to 100% v/v.
- Palladium – Nickel alloy films provide high stability.
- Proprietary coating enables continuous operation in harsh contaminant environments.
- Temperature control loop compensates for external fluctuations.
- Sensor capable of operation in N<sub>2</sub>, O<sub>2</sub>, other inert gas backgrounds and multi-component, varying gas and liquid streams.

$\frac{DR}{R} = 0.71 (PH_2)^{0.42}$  (in %)

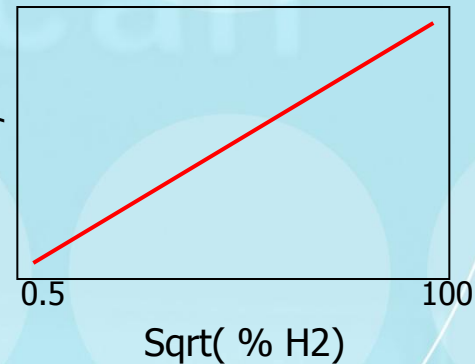


# H2 Specific Resistor Circuit

- Pd catalyzes H<sub>2</sub> (molecular) into 2H (atomic)
- Hydrogen absorbed - changes Bulk Resistivity
  - Hydrogen Sensing Resistor (HRES) uses this property to measure Hydrogen from 0.5% to multiple atmospheres.
  - On-chip heater and temperature sensor



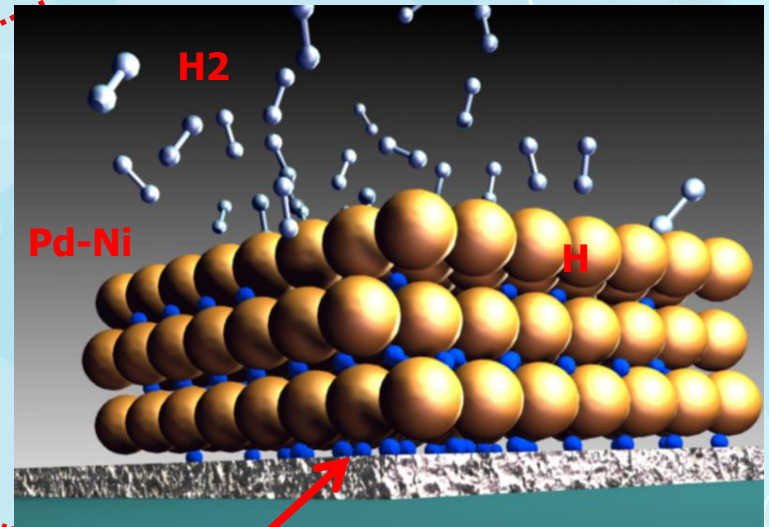
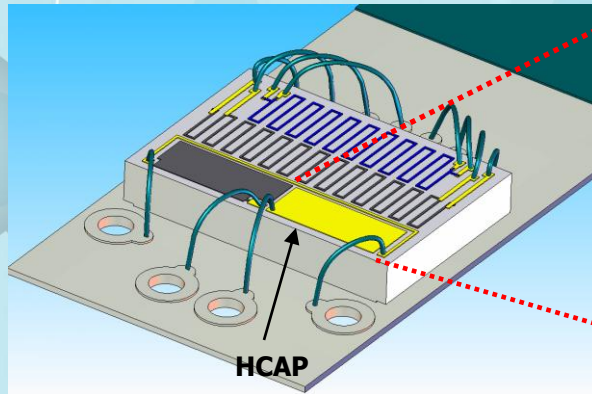
$\Delta R / R$





# H2 Specific Capacitor Circuit

Charge Density– Hydrogen Sensing Capacitor (HCAP) uses this property to measure Hydrogen from 15 ppm to 0.5% (in air).



**Charge Density  
varies with H2**

# Sensor Integration

