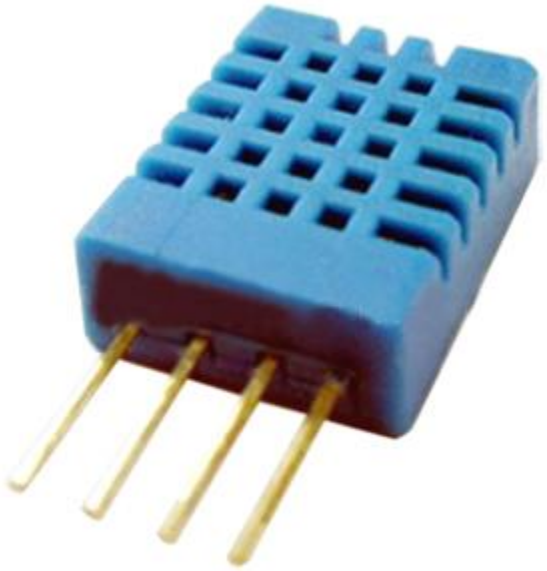
HUMIDITY SENSOR

(INSTRUMENTAL TECHNIQUES)



P. Srikrishnarka

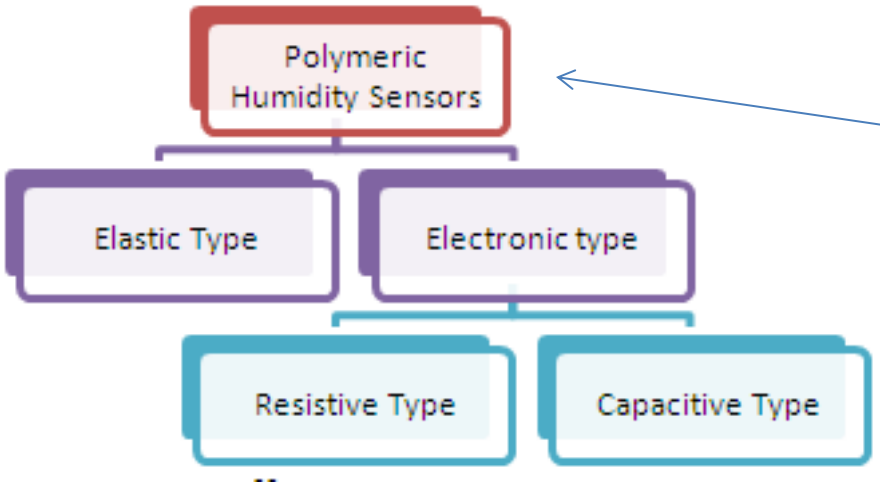
HUMIDITY

Presence of water vapour in air

S.No	Term	Definition	Unit
1	Absolute Humidity (Vapor Concentration)	Ratio of mass(vapour) to volume.	grams/m^3
2	Mixing Ratio OR Mass Ratio	Ratio of mass(vapour) to mass(dry gas)	grams/m^3
3	Relative Humidity	Ratio of mass(vapour) to mass(saturated vapour) OR ratio of actual vapor pressure to saturation vapor pressure.	%
4	Specific Humidity	Ratio of mass(vapour) to total mass.	%
5	Dew Point	Temperature(above 0°C) at which the water vapor in a gas condenses to liquid water)	°C
6	Frost Point	Temperature(below 0°C) at which the water vapor in a gas condenses to ice	
7	Volume Ratio	Ratio of partial pressure(vapour) to partial pressure (dry gas)	% by volume
8	PPM by Volume	Ratio of volume(vapour) X 10^6 to volume(dry gas)	PPM_V
9	PPM by Weight	PPM X	PPM

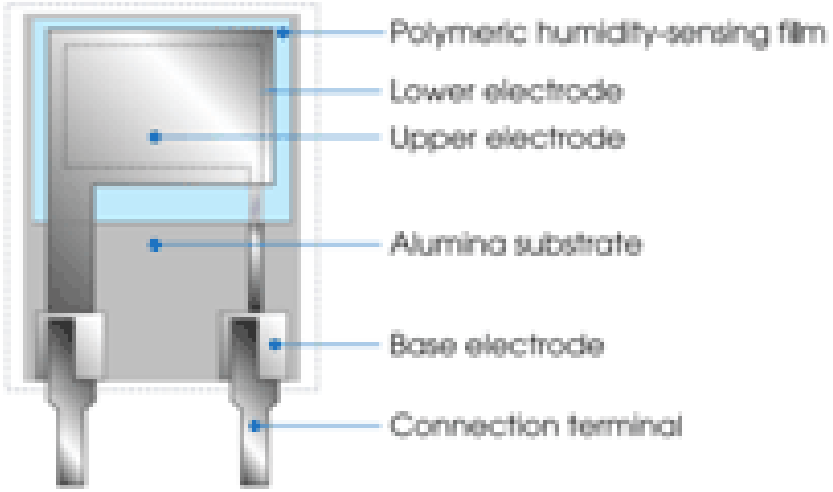
Humidity Sensing: Classification

Active Material	Thermo-set Polymer	Thermoplastic Polymer	Thermoplastic Polymer	Bulk Thermoplastic	Bulk AlO3	Lithium Chloride Film
Substrate	Ceramic or Silicon	Ceramic or silicon	Polyester or mylar film	N/A	N/A	Ceramic
Sensed Parameter	Capacitance	Capacitance	Capacitance	Resistance	Resistance	Conductivity
Measured Parameter	%RH	%RH	%RH	%RH	%RH	%RH
RH Change	0% to 100%	0% to 100%	0% to 100%	20% to 100%	2% to 90%	15% to <100%
RH Accuracy	±1% to ±5%	±3% to ±5%	±3% to ±5%	±3% to ±10%	±1% to ±5%	±5%
Interchangability	±2% to ±10% RH	±3% to ±20% RH	±3% to ±20% RH	±5% to ±25% RH	poor	±3% to ±10% RH
Hysterisis	<1% to 3% RH	2% to 5% RH	2% to 5% RH	3% to 6% RH	<2% RH	very poor
Linearity	±1% RH	±1% RH	±2% RH	poor	poor	Very poor
Risetime	15 s to 60 s	15 s to 90 s	15 s to 90 s	2 min to 5 min	3 min to 5 min	3 min to 5 min
Temperature Range	-40 °C to 185 °C	-30 °C to 190 °C	-25°C to 100 °C	10 °C to 40 °C	-10 °C to 75 °C	-
Long Term Stability	±1%RH/5 yr	±1%RH/yr	±1%RH/yr	±3%RH/yr	±3% RH/yr	>1% RH/°C



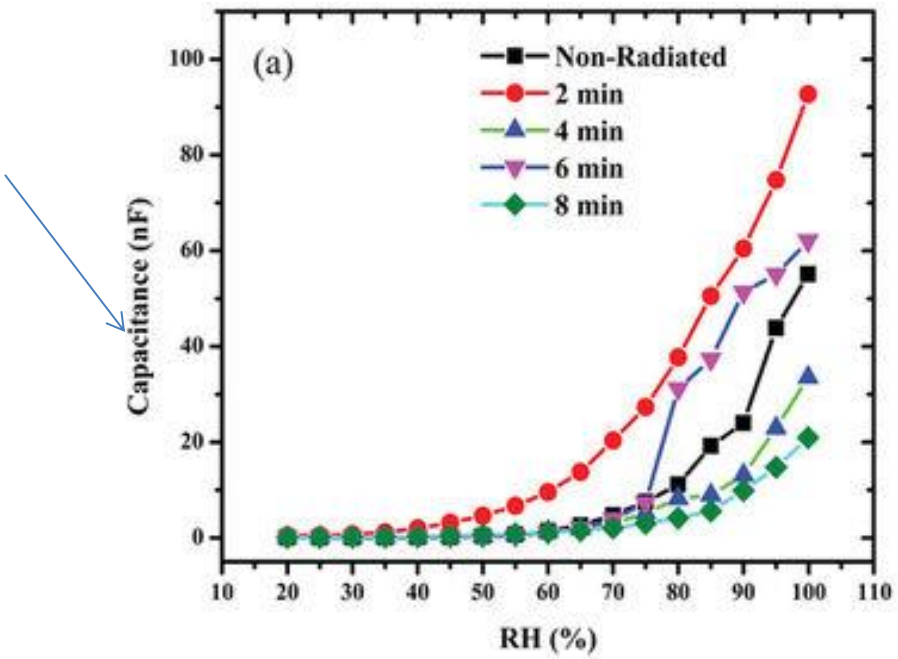
Classification in sensing mechanism

Schematic of a sensor



https://www.engineersgarage.com/articles/humidity-sensor

Relation between Capacitance and RH



Hassan Maktuff Jaber Al-Ta'ii, Yusoff Mohd Amin & Vengadesh Periasamy "Humidity influenced capacitance and resistance of an Al/DNA/Al Schottky diode irradiated by alpha particles" *Scientific Reports* **6**, Article number: 25519 (2016)

General Precautions for Humidity Sensor

Storage environment

If you do not want to use the sensor, please keep the following conditions in order to maintain the accuracy.
Temperature range : 10 to 50 °C
Humidity range : 20 to 60% RH
Do not use antistatic polyethylene bag (light blue, pink or rose color).

Influence of temperature

The value of the relative humidity will be strongly dependent on the temperature. If you want to measure the temperature and humidity of the surroundings, please check that there are no heat-generating components to the mounting surface.

Organic gas

The humidity sensor makes the detection of water molecules, but can sometimes detect other gases. When the sensor portion is prolonged exposure to an atmosphere of high concentration of gaseous solvent, it can cause contamination of the sensor detection unit. In order to bring out the high performance of the sensor, please stop use or store in a place like that gas emissions.

Influence from light

The sensor is not light sensitive. However, prolonged exposure to direct sunlight or strong UV radiation will shorten the life of the sensor of the filter.

Maintenance

Detection unit is protected by the filter. If the terrible dirt of filter due to dust, please clean it can cause clogging of the filter.

THANK YOU