# MICA HUMIDITY SENSORS - PRELIMINARY STUDIES

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The dielectric properties of pure muscovite mica samples of different geometrical shapes, equilibnated with atmospheres of 0% to 100% relative humidity at a constant temperature of 298K were investigated to determine suitable sensor configurations. The three factors affecting the geometry, thickness, area and shape, were varied one at a time, keeping the other two constant. A two-terminal electrode system was used to measure the capacitance and conductance of each geometry. The capacitance values were in the range 200pF to 900pF while the conductance values varied between 0.01 $\mu$v and 0.3 $\mu$v. An increase in both capacitance and conductance were observed with increasing relative humidity.

It was observed that increasing the sensor area, while increasing the absolute capacitance and conductance values, showed the response and reduced the percentage variation. Areas between 1cm$^2$ and 2.5cm$^2$ seemed the best compromise, giving reasonable absolute values, significant percentage variations and fast responses. Changing the shape did not affect the dielectric properties significantly for small areas. For large areas, shapes having longer boundaries gave faster responses. The effect of varying the thickness from 0.01mm to 0.03mm was not significant.

The observed effects of different geometries on the humidity response can be described in terms of the ease with which water molecules gain access to the layered structure of mica.