

aixDBLI

8 inch wafer Double Beam Laser Interferometer (aixDBLI)

As innovation leader for electrical thin film testing aixACCT Systems has extended the well approved double beam technique to the first commercially available Double Beam Laser Interferometer system for 8 inch wafer characterization. This semi-automatic system is used for piezoelectric and electrical reliability testing of MEMS (micro electro mechanical systems) devices on 8" wafers. The excellent resolution of this system with an repeatability accuracy better than 2 % distinguish this system for mass production qualification.

The aixDBLI system offers measurements of thin film thickness changes under electrical excitation with a proven accuracy (x-cut quartz) of 0.2 pm/V. The main feature of the system is the ultra fast acquisition time of a few seconds for a single measurement. Based on a new data acquisition algorithm, the measurement speed is enhanced by a factor of 100. This enables for the first time the comparison of electrical and mechanical data for thin films recorded at the same excitation frequency. Due to the differential measurement principle the influence of sample bending is eliminated, which is the major obstacle using atomic force microscopes (AFM) for these types of measurements.

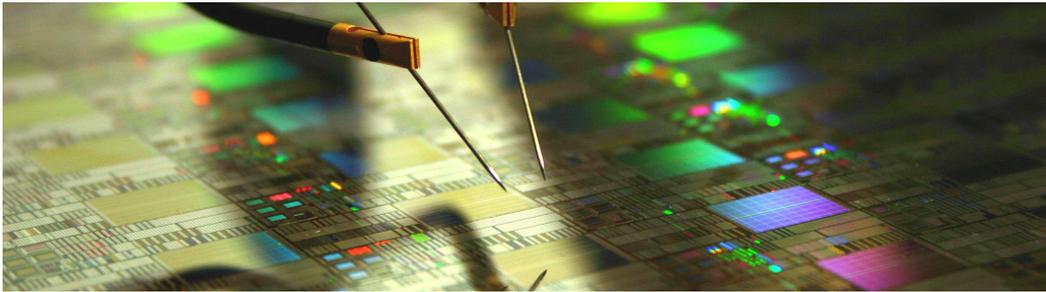


Measurements:

- Electromechanical large signal strain and polarization and piezoelectric small signal coefficient and dielectric constant. From these values the coupling coefficient can be derived by using the additional aixPlover software tool if the stiffness value is known.
- Fatigue and reliability of electric and electromechanical properties.

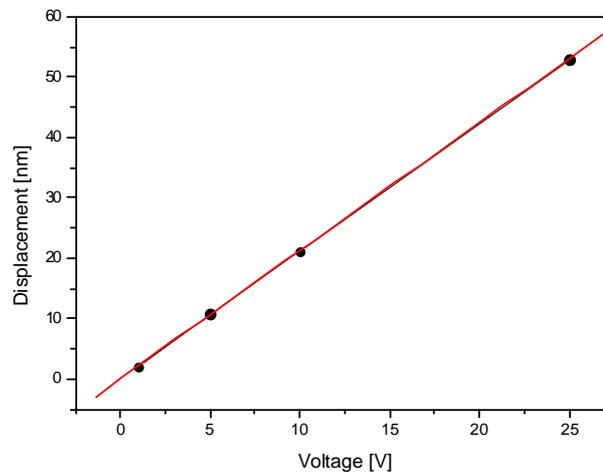
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The unique properties of the aixDBLI system make it suitable in combination with a semi-automatic or automatic prober station for applications in production environments with high throughput requirements on 6'' and 8'' wafers. The whole set-up consists of optical components in a vibration damped chamber, the TF Analyzer 2000 and some additional analog circuitry. The system is operated and controlled by a Windows XP™ based measurement suite with linked programs for the TF Analyzer, for settings of the prober station and wafer positioning and contacting.



■ Accuracy and repeatability

1. Measurement of a x-cut quartz sample at different excitation voltages



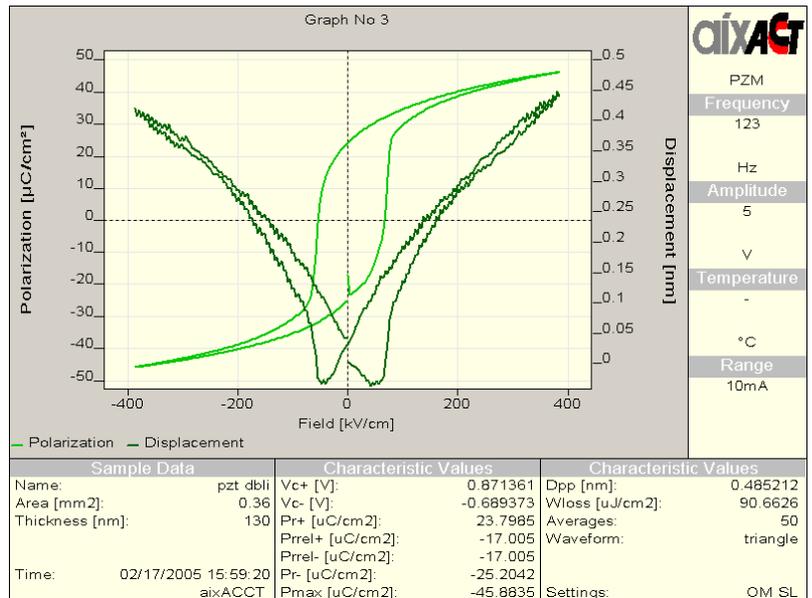
2. Piezoelectric and dielectric coefficient measurement: 10 consecutive measurements at the same pad show a repeatability better than 2 %.

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Sample Measurements

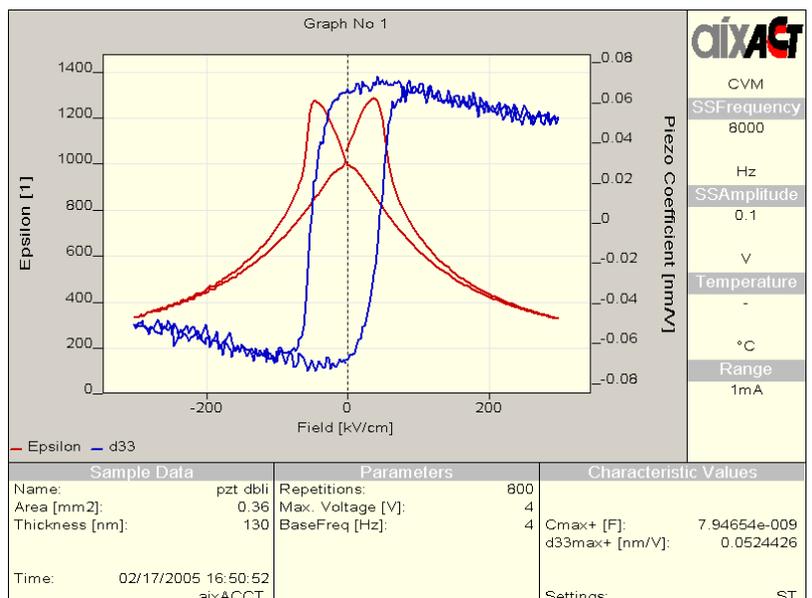
1. Polarization and Displacement

Large signal polarization and displacement measurement.
PZT thin film sample response to large signal excitation voltage at room temperature.



2. Capacitance and Piezocoefficient

Small signal capacitance and piezocoefficient measurement.
PZT thin film sample response to a DC bias voltage signal superposed by a small signal excitation voltage at room temperature.



■ **Technical Data**

Resolution	≤ 1 picometer tested by x-cut Quartz	
Measurement range	5 pm to +/- 25 nm	
Wavelength	632.8 nm	
Displacement/strain measurement	<ul style="list-style-type: none"> • 50 Hz - 5 kHz • 100 mV to 10 V up to 200 V (optional) 	
Piezoelectric d_{33} coefficient	Bias voltage	(1 mHz to 1 Hz) 100 mV to 10 V up to 200 V (optional)
	Small signal	(1 kHz to 10 kHz) 100 mV to 10 V
C(V) Measurement	Bias voltage	(1 mHz to 1 Hz) 100 mV to 10 V up to 200 V (optional)
	Small signal	(1 kHz to 10 kHz) 100 mV to 10 V