

Peltier Test

For calibration of cantilever deflections we take advantage of the gold coating of the cantilevers. Due to the bimetallic effect (difference in thermal expansion coefficients of silicon cantilever and gold coating, changing the temperature of the cantilever by typically 1 °C will result in a defined bending of the cantilever by several hundred nanometers, reflecting the elastic properties of the cantilever. The cantilever measurement cell (liquid cell) contains a Peltier element situated very close to the lumen of the chamber to allow temperature regulation within the chamber. The entire experimental setup is housed in a temperature controlled box regulated with an accuracy of 0.01K to the target temperature, so that additional thermal influences from the environment are excluded. In the so-called peltier test, a defined heat pulse is applied to the Peltier element, heating up the cantilever by typically 1°C for 30 seconds. The metal-coated cantilever responds by bending. This procedure is called 'Peltier test' or 'heat test'. If performed before (and after) the 'real' experiment, it will provide information about the homogeneity of the mechanical properties of the cantilevers and the homogeneity of the metal coating across all cantilevers of the array, but not on the performance of the functional layer, e.g. a biochemical layer. The heat test is a useful tool to verify the homogeneity of the array (should be within < 10% of peak deflections occurring due to the heat pulse).