Precision Measurement of Nano-dimensional Scales by Using High-resolution AFM

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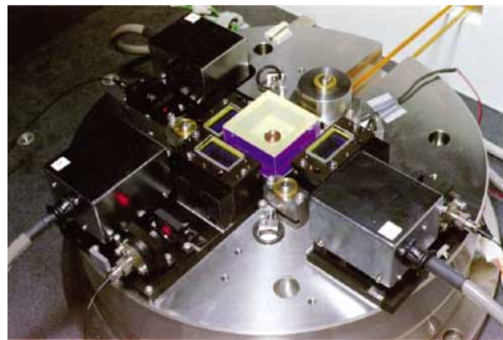
As nanotechnology has developed, precision measurement on a nanometer order (nanometrology) has become important. In order to meet this demand, we have developed and investigated an AFM system with a high-resolution three-axis laser interferometer (nanometrological AFM). We have performed precision measurements of 1-dimensional (1D) gratings as a nano-dimensional scale and uncertainty estimation in pitch measurements. The calibrated dimensions of AFM images are traceable to the international unit of length through a laser wavelength. The resolution of the interferometer was approximately 0.04 nm. For a pitch measurement of a 1D grating with a 240 nm pitch in nominal value, we obtained a pitch value of 239.98 nm and estimated an expanded uncertainty of 0.280 nm.



AFM with XYZ three-axis laser interferometer (Nanometrological AFM)

Development of a High-Temperature Platinum Resistance Thermometer

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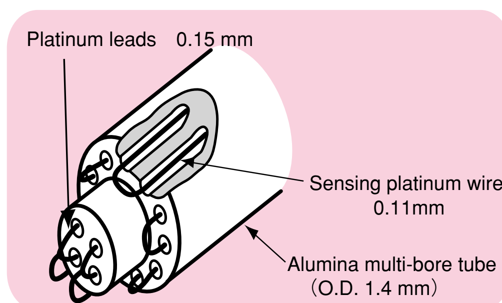
High-Temperature Platinum Resistance Thermometer (HTPRTs), using alumina as an insulator, were developed at AIST. The HTPRTs were designed for practical purposes and their stability in the horizontal use was tested. The result showed that they were stable enough in the horizontal direction up to 800 ℃.



Construction of the sensing element of the high-temperature platinum resistance thermometer