

Fiber interferometer-based variable temperature scanning force microscope

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A scanning force microscope designed for an operation at temperatures between 4.2 and 300 K is presented. The deflection of the microfabricated force sensing cantilever is detected via an optical fiber interferometer. For low temperature imaging the whole instrument is incorporated into a bath cryostat which is suitable for both liquid helium and liquid nitrogen cooling. The instrument is of highly symmetric design in order to avoid large inner misalignment of the interferometer due to thermal expansion/contraction during temperature changes. In addition to this thermally compensated design, the interferometer can be adjusted by piezo actuators in situ in three dimensions.