

SW-P003

Temperature-dependent tendency of target DNA translocation through a nanocapillary functionalized with probe DNA

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We have measured DNA translocation through a nanocapillary functionalized with probe DNA. These DNA-functionalized nanocapillaries selectively facilitate the translocation of target ssDNAs that are complementary to the probe ssDNAs. In addition, translocation of the complementary target ssDNA exhibits two tendencies to translocation speed, such as fast and slow translocation, whereas that of non-complementary target ssDNA yields only one tendency, fast translocation. These observations suggest that the complementary and non-complementary target ssDNAs may be discriminated due to different interaction strengths between target and probe ssDNAs. The temperature dependence measurements of DNA translocation show that slow translocation events are ascribed to the complementary interaction between probe and target ssDNA. This confirms that their dwell time is dependent on the base-pair binding strength. These results demonstrate that mere single-base different target DNA can be selectively detectable by using the probe DNA-functionalized nanocapillaries.

Keywords: Nanocapillary, DNA, Functionalization

SW-P004

STM investigation of as-cleaved and annealed single crystalline GeTe (111) surface

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Despite the growing interest in GeTe as a archetypal displacive ferroelectric material as well as the basis of related materials used in data-storage applications, atom-resolved study of single crystalline GeTe surface been lacking. Using low temperature scanning tunneling microscopy (STM) and spectroscopy (STS), we investigated as-cleaved and annealed surfaces of GeTe. We found that as-cleaved GeTe(111) surface is composed of at least two kinds of terraces at 78 K. While two terraces show metallic characteristics, they also exhibit distinctive I-V spectra and imaging conditions, with each being attributed to Ge-terminated, and Te-terminated surfaces respectively. GeTe(111) surfaces annealed at moderately elevated temperature introduces intricate networks of extended defect structures. We will present these data and discuss the role of vacancies in the formation of these structures.

Keywords: Single crystalline GeTe(111) surface, Scanning tunneling microscopy, Scanning tunneling spectroscopy