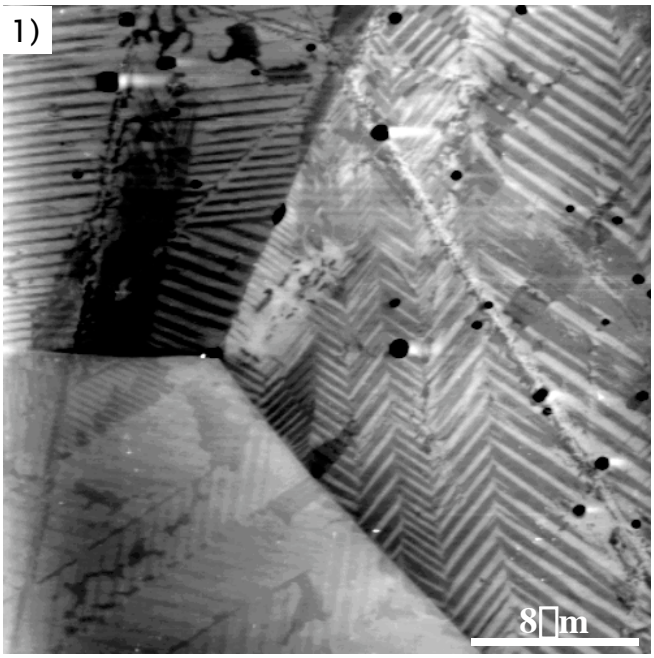
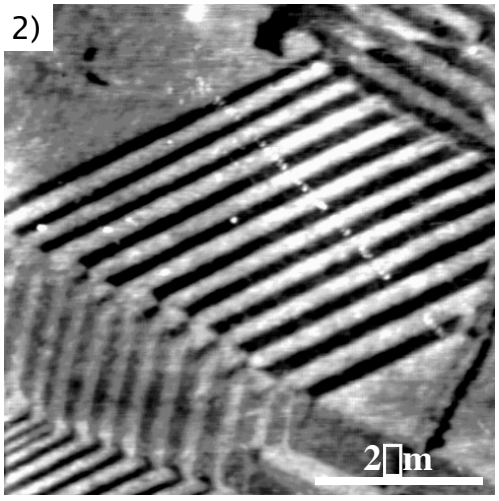
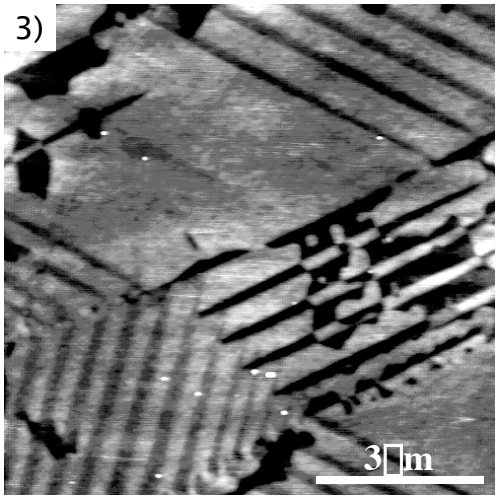
Ferroelectric Domains in $BaTiO_3$ Polycrystals



Atomic Force Microscopy (AFM) was used to study the as-polished surface of polycrystalline $BaTiO_3$. $BaTiO_3$ exhibits two different types of ferroelectric domains, named for the relative positions the polarization vector across the domain wall. 90° domain walls lie on a (110)-type plane and are straight while, 180° walls are not restricted to a particular habit plane and typically appear "curvy".

All three AFM micrographs were taken after polishing the ceramic with 0.02mm colloidal silica in an aqueous base. The surface relief is caused by differential polishing rates. Figure 1 shows a typical triple junction and both 90° and 180° domains. Figure 2 is a higher resolution image of a different grain clearly showing a number of 90° domains. Figure 3 shows a number of distinct 180° domains intersecting 90° domains. The height difference between the highest contrast domains in both Figures 2 and 3 is ~ 30Å while the height difference between lower contrast domains is between 10Å and 20Å.





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