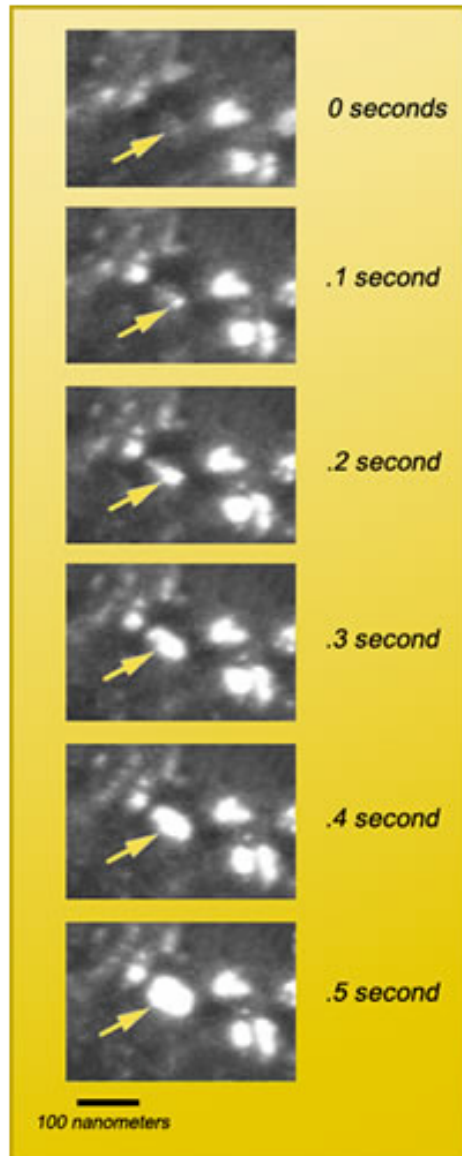
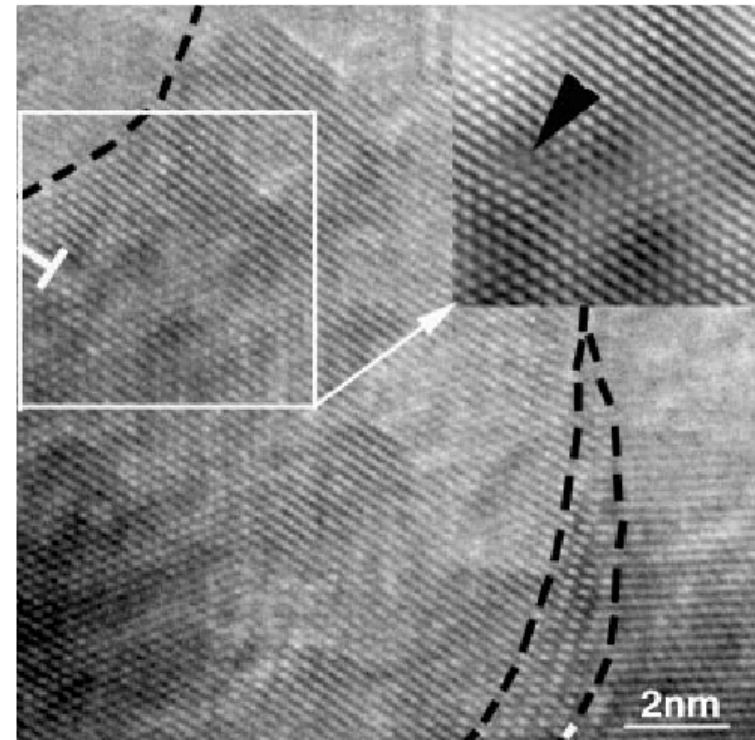


New Light on How Metals Change Shape at the Nanoscale

Grain boundary processes play a dominant role in nanoscale deformation



Grain boundary mechanism is seen in images from NCEM's In-Situ Microscope of a nanocrystalline Ni film under tensile stress. In “dark field” conditions only grains with certain orientations appear as bright spots. Under load, a bright spot appears and grows (arrow) showing that a grain has rotated and/or been deformed to attain this orientation. This provides direct evidence of a grain boundary mediated deformation process in nanocrystalline metals.



Dislocation mechanism, usually seen in coarse-grained metals is also in small grains. A trapped dislocation (white T in main image, black arrowhead in filtered inset) is found in a small grain whose boundaries are indicated by the black dotted lines.