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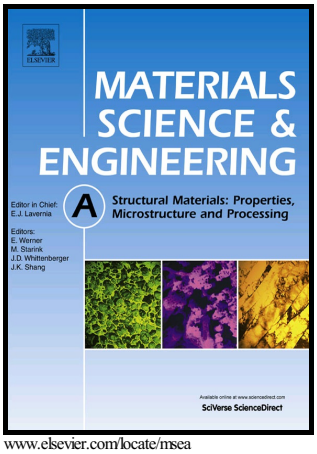

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Mechanical Behavior and Deformation Mechanism of Commercial Pure Titanium Foils

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Abstract: The work presents a detailed investigation of mechanical properties and deformation mechanism of ultrathin commercial pure Ti foils subjected to uniaxial tensile. The initial microstructure of the annealed Ti foils is fine equiaxed grains, with an average grain size of 3.3 μm. The main types of texture in pure Ti foils are $\{10\bar{1}3\}$ and $\{11\bar{2}4\}$. Dimples, tear ridges and slip traces are found on the fracture surface, and the elongation reaches 16.7%. The large tensile elongation of pure Ti foils can be attributed to the slip of dislocations, twinning and phase transformation of HCP-Ti to FCC-Ti, which is confirmed by both X-ray diffraction and transmission electron microscope. The orientation relationship of the two phases is determined to be: $<0001>_{HCP}$ // $<001>_{FCC}$, $<11\bar{2}0>_{HCP}$ // $<1\bar{1}0>_{FCC}$ and $\{01\bar{1}0\}_{HCP}$ // $\{110\}_{FCC}$. According to this relationship, the HCP to FCC phase transformation expands the

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