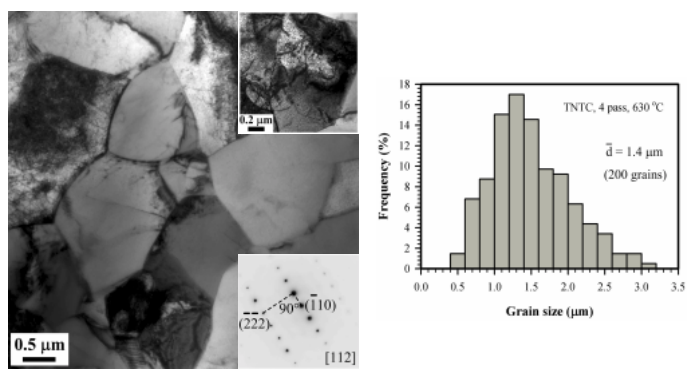


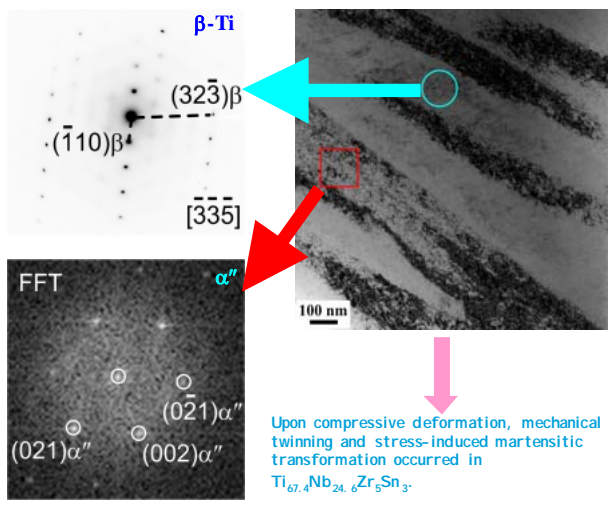
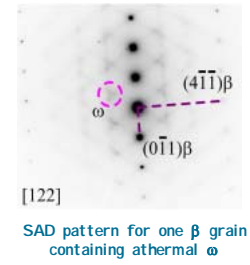
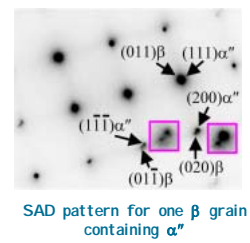
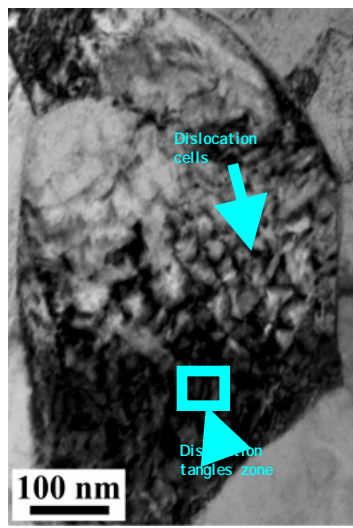
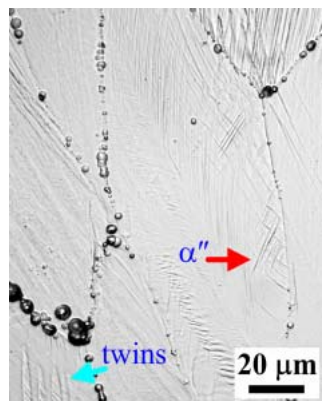
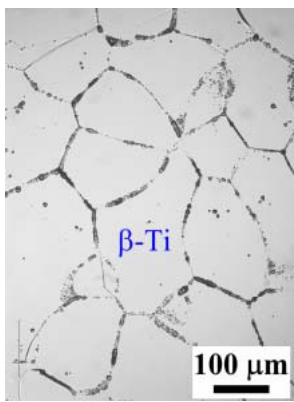
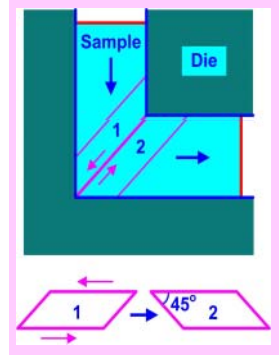
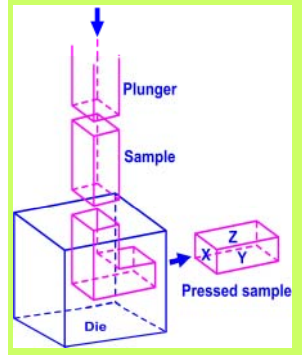
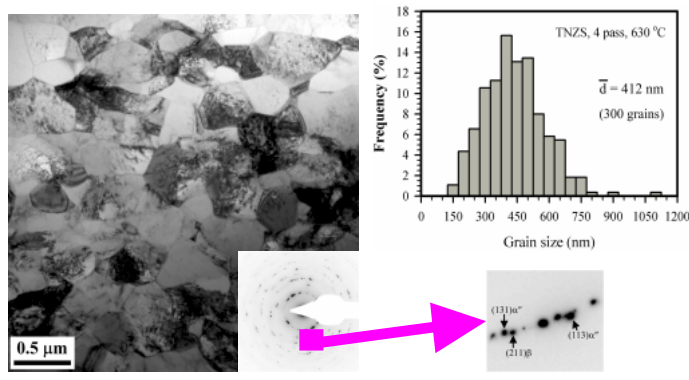
Bulk ultrafine-grained and nano-structured metals and alloys have exhibited unique mechanical properties and have attracted growing interests during the past decade. As a promising approach, equal channel angular pressing (ECAP) was employed here to synthesize metastable beta-Ti alloys with ultrafine-grained structure.

$Ti_{73.5}Nb_{19.6}Ta_{4.5}Cr_{2.4}$  ( $B_o=2.866$ ,  $M_d=2.423$ ) and  $Ti_{67.4}Nb_{24.6}Zr_5Sn_3$  ( $B_o=2.866$ ,  $M_d=2.455$ ) with high and low stability, respectively, were processed using ECAP at 630 °C for 4 passes, to explore the effect of martensitic transformation on grain refinement.

ECAPed  $Ti_{73.5}Nb_{19.6}Ta_{4.5}Cr_{2.4}$ , 4 passes at 630 °C



ECAPed  $Ti_{67.4}Nb_{24.6}Zr_5Sn_3$ , 4 passes at 630 °C



- A uniform ultrafine-grained structure was easily attained in a metastable bcc  $Ti_{67.4}Nb_{24.6}Zr_5Sn_3$   $\beta$  alloy with low stability, by using equal channel angular pressing for 4 passes at an elevated temperature of 630 °C.
- The pronounced deformation-induced grain refinement is believed to result from both the stress-assisted martensitic and reverse austenitic transformations during severe plastic deformation, and from the interaction between dislocations in  $\beta$  and the  $\alpha''$  martensite.