

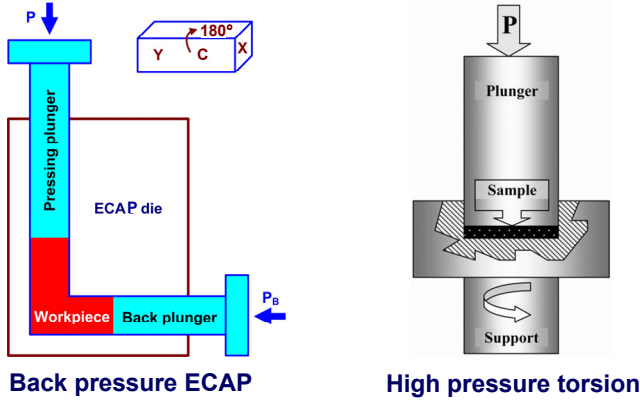
# Microstructure Control and Structure-property relationship in UFG/NS Ti-based Alloys and Composites

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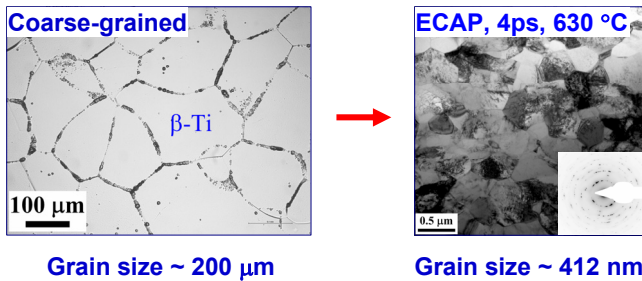
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## Introduction

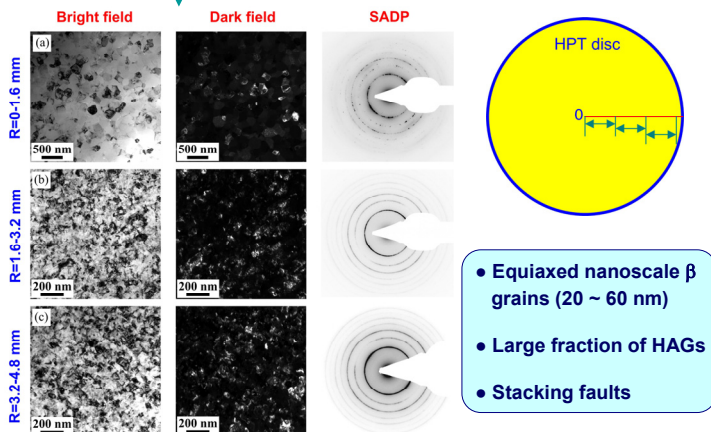
The physical dimension of grains or phases in metallic materials is crucial for determining resultant mechanical properties such as strength and ductility. In the present investigation, severe plastic deformation techniques in the form of equal channel angular pressing (ECAP) and high-pressure torsion (HPT) have been utilized to realize substantial modification of grain structure at the ultrafine/nanometer scale in titanium-based alloys and composites, including  $Ti_{67.4}Nb_{24.6}Zr_5Sn_3$   $\beta$  alloy and TiN-reinforced titanium matrix composites.



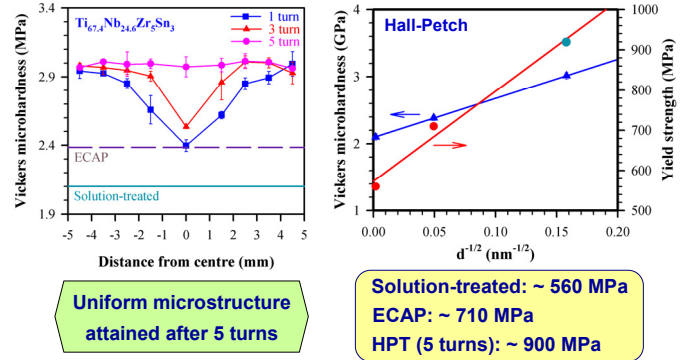
## Ultrafine-grained/nanostructured beta-Ti alloy



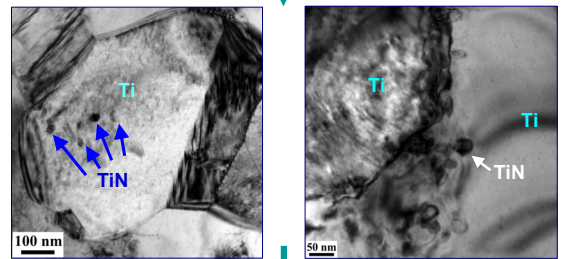
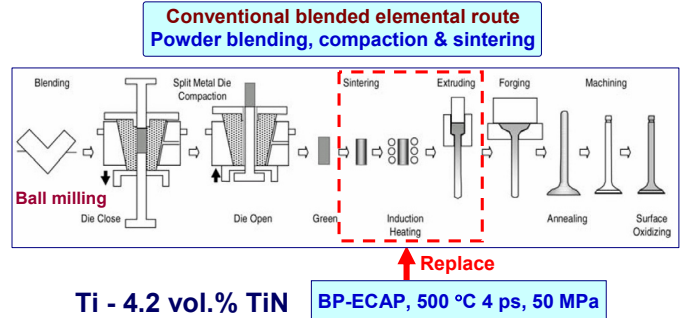
HPT at RT, 5 turns



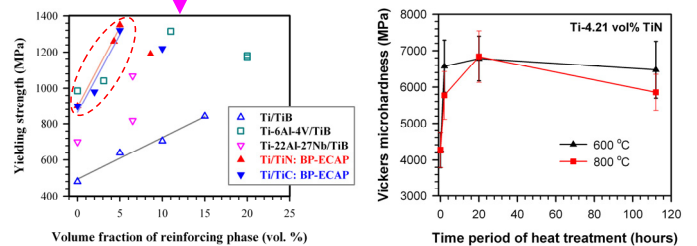
## Mechanical properties of UFG/NS beta alloy



## TiN-reinforced nanostructured Ti matrix composites



## Ultrafine-grained Ti matrix reinforced with nanoscale TiN phase



Annealing at 600 °C for 20 h

