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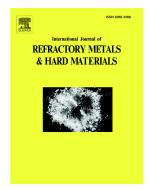
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Fracture of

severely plastically deformed Ta and Nb

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Abstract

A comparative study focusing on the fracture characteristics of severely

plastically deformed (SPD) Nb and Ta is presented. Since many SPD-processes lead to

typically elongated microstructures, orientation dependent fracture toughness

measurements with three different crack orientations were performed. Among the

various testing orientations, two exhibit a considerably high fracture toughness in both

materials. The high fracture resistance in these orientations will be discussed on the

basis of the significance of crack deflection and delamination processes. In both

materials the lowest fracture toughness was found in the third testing orientation parallel

to the grain elongation. However, between Nb and Ta the fracture toughness differs in

this orientation by a factor of three, rendering Nb even parallel to the grain alignment to

a quite fracture resistant material.

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Keywords: severe plastic deformation; high pressure torsion; fracture toughness;

ultrafine-grained; nanocrystalline; niobium; tantalum;

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