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Shear Strength Development in Tantalum Alloys: Effects of Cold Work and Alloying JEREMY MILLETT, GLENN WHITEMAN, NEIL BOURNE, SIMON CASE, AWE, Aldermaston, RUSTY GRAY, Los Alamos National Laboratory — The response of tantalum and its alloys during shock loading conditions is controlled largely by the motion of dislocations present within the microstructure. This has been attributed to the high Peierls stress reducing the ability of these materials to accommodate strain by the generation of additional dislocation line length. This has manifested itself in the mechanical response as a clear reduction in shear strength behind the shock front, as dislocation motion is considered a stress relief mechanism. However, it has also been shown that this shear strength reduction can itself be reduced, either by prior cold work before shock loading, or via simple alloying such as an addition of 2.5wt% tungsten. In this work, we explore these issues further by investigating the shear strength development in a cold rolled Ta2.5wt%W alloy (50% reduction in thickness) and an annealed Ta-10wt%W alloy. Results are compared to previous work on annealed tantalum and Ta-2.5wt%W, and a 50% cold rolled pure tantalum.

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