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# Exploring the plasticity of β phase strengthened by fine scale, multivariant α in a titanium alloy

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We describe in this contribution the (non-random) distribution of the α phase within large β grains of the high strength titanium alloy, Ti5553 alloy and then examine plasticity of such a microstructure using a variety of techniques. Observations and estimates of slip lengths in such microstructures incorporating ideas of slip transfer between the α and β phases provide good estimates of the yield stress. The evolution of strain and strain partitioning between α and β is examined experimentally through high-resolution EBSD and DIC, coupled with in-situ straining of single β grains containing a fine-scale distribution of α in an SEM. These experimental studies are supported by crystal plasticity simulations that indicate a reasonably match between theory and experiment. It is believed that this study will provide a greater understanding of the plasticity of high strength metastable b alloys as well as that of the transformed β constituent of bimodal structures in α+ β alloys.

*Keywords: Titanium alloys, strength, plasticity, DIC, EBSD*

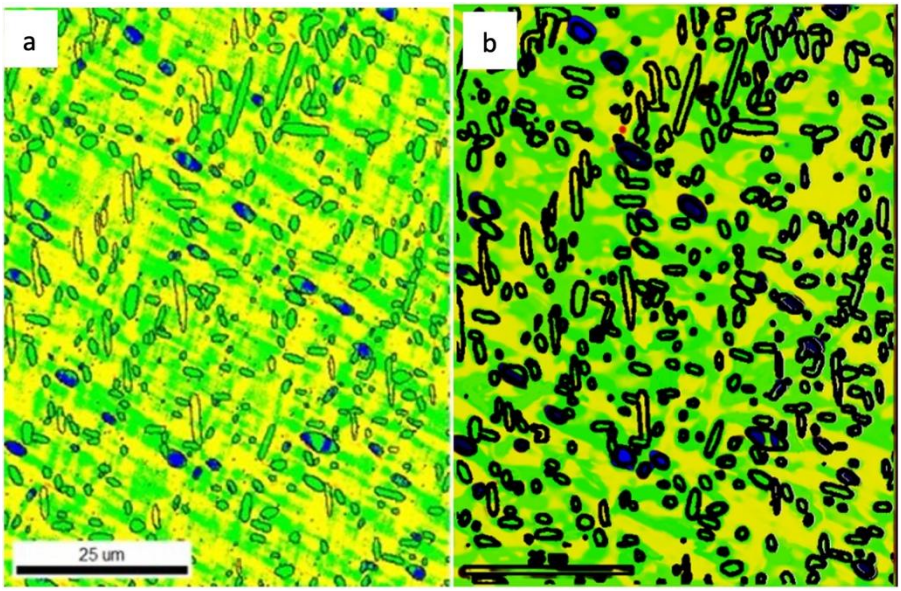


Fig.1 Comparison of (a) crystal plasticity simulations and (b) micro DIC strain contours showing strain partitioning between α and β in a fine 2-phase α+β structure of the Ti 5553 alloy