Elimination of oxygen sensitivity in α-titanium

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Oxygen interstitials, even in a very small amount, will generate a dramatic increase in strength but also a substantial degradation in the ductility of Ti, especially at low temperature. The potent effect of O in Ti drives the increased cost to either purify Ti during industrial manufacturing and/or alloy Ti with expensive elements. Here, we discuss both alloying and processing strategies to mitigate or even eliminate the detrimental effects of O in Ti. These strategies will be discussed in terms of short range order (SRO), the evolution of dislocation structure during deformation (wavy vs. planar slip) and the correlation of brittle grain boundaries and twin types with oxygen content.