

Induced twinning deformation in Al by compressed volume and lattice distortion

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We investigate plastic deformation behavior of face centered cubic (FCC) Al under compressed volume and lattice distortion via first principles. Competition between slip and twin barriers is dealt as main mechanism of plastic deformation, and this is well described in plastic deformation map (PDM) [1]. We observe that generalized stacking fault energy (GSFE), consisted with intrinsic, extrinsic, unstable stacking fault energy and unstable twinning fault energy, linearly depend on volume and lattice distortion, but their change as a function of volume and lattice distortion is not same. Based on PDM and observed GSFEs, we find that volume and lattice distortion effectively modify the plastic deformation behavior, and twinning deformation in Al can be induced by compressed volume and lattice distortion.

References

[1] Jo *et al.*, Proc. Natl. Acad. Sci. **111**, 6560 (2014)