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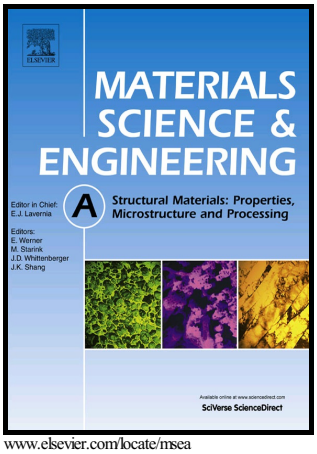

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New role of screw dislocation in twin lamella during deformation: An in situ TEM study at the atomic scale

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Abstract

Two dynamic processes were revealed in Cu by in situ tensile tests at the atomic scale: a lattice screw dislocation forming by the combination of two twinning dislocations; and two 60° full dislocations evolving from an extended screw dislocation. The results indicate that screw dislocation can trigger the transition of dislocation slip mode by its formation and dissociation, and also nucleate non-screw dislocations.

Keywords: Screw dislocation; Twin; Deformation; Slip mode; In situ HRTEM

1. Introduction

The past decade has witnessed an explosion of interest and research on the nanotwined face-centered cubic (fcc) metals because they exhibit an unusual combination of high strength and considerable plasticity and work hardening[1-13]. It