Fatigue damage healing model based on dislocation reverse-back under unconstraint vibration condition for copper film

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Abstract

In this investigation, it is found that the generated elastic stress during the unconstraint vibration treatment process can act as the dislocation driving stress on the dislocation in the micro-scale. When the sum of the dislocation driving stress, the image stress and the back stress exceeds the motion resistance of the dislocations in a pile-up, the dislocations begin to reverse back, and the pile-up disappear. Based on this principle, a fatigue damage-healing model under unconstraint vibration condition was proposed. The verified results showed that the damaged copper film can be effectively healed by the vibration guided by the model calculation.

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