POSTPONING CRACK NUCLEATION IN SUPERSATURATED XXXX ALUMINIUM ALLOYS

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Keywords: Fatigue resistance, Aluminium alloys, Dynamic precipitation

ABSTRACT

Recently, a novel strategy to improve the fatigue resistance of aluminium alloys has been proposed, which is based on the spontaneous annihilation of deformation induced damage of aluminium alloys in a supersaturated state. It is proposed that dynamic precipitation in the early stages of crack initiation occurred in the vicinity of defects. Thus, the process can be interpreted as self-healing of fatigue damage.
The objective of the present work is to investigate alternative temperature treatments that can enhance the fatigue resistance through the above self-healing mechanism. The material used is an underaged XXXX aluminum alloy tested under various fatigue conditions, combining load blocks and healing cycles. The underlying healing processes will be analyzed by positron annihilation and other microscopic techniques.