Influence of heat treatment and creep loading on the microstructure of an Al-Cu-Li alloy

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Al-Cu-Li alloys are materials of substantial interest for aerospace and automotive applications (Heinz et al., 2000, Hirsch and Al-Samman, 2013). The addition of just 1 mass% lithium to the aluminium leads to a significant increase in Young's modulus and allows a considerable reduction of weight. The strength can be raised by the formation of T_1 (Al_2CuLi) and θ' (Al_2Cu) precipitates during artificial aging. The focus of this work is the characterization of the microstructural evolution of these precipitates in an Al-4 % Cu-1 % Li (mass %) alloy by transmission electron microscopy (TEM) as a function of the heat treatment parameters. The volume fractions and precipitate radii were determined to compare the different aging states of the material (Hausler et al., 2017). To investigate the effect of an external load during aging of peak-aged samples, uniaxial creep tests were carried out under different stress conditions. Moreover, the microstructure of crept specimens was analysed by TEM to determine the stress effect on the precipitate size evolution.

The authors express their thanks to the German Research Foundation (DFG) for funding under grant DA 1655/1-1 within the priority program SPP1713.

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