Resurgence of texture in cyclically deformed austenite

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Abstract

Many studies monitoring the low cycle fatigue behaviour of austenitic stainless steels at various loading amplitudes and environments are reported in the open published domain literatures since last semi centennial. In those literatures, the cyclic plasticity behaviour is mainly explained and discussed in terms of microstructural characterisations, solid state phase transformation behaviour and related dislocation characteristics of these alloys. There is lack of literatures data available on the orientation density distribution after strain controlled low cycle fatigue deformation of metastable austenite at various loading amplitudes under ambient temperature, which has been primarily aimed at in the current investigation. The propensity of maximum pole density distribution of deformed polycrystalline austenite grains has been found to be decreased consistently with increasing strain amplitude under strain controlled low cycle fatigue deformation at various domains of pole angles defined for all stereograms of upper hemisphere and hence variation in cyclic plastic response of the alloy. The continuous *resurgence* of crystallographic textures of polygonal austenite happens with the orderly variation of loading amplitudes during cyclic plasticity. Present research will specifically help to understand the related dislocation characteristics and mechanisms of the martensitic phase transformations owing to fatigue damage accumulation and fracture micro mechanisms.

Keywords

Austenite; Texture; Fatigue; Martensite; Dislocation; Stainless steel.