In situ observation of triple junction motion during recovery of heavily deformed aluminum

Microstructural evolution during in situ annealing of heavily cold-rolled aluminum has been studied by transmission electron microscopy, confirming that an important recovery mechanism is migration of triple junctions formed by three lamellar boundaries (Y-junctions). The migrating Y-junctions are pinned by deformation-induced interconnecting and lamellar boundaries, which slow down the recovery process and lead to a stop-go migration pattern. This pinning mechanism stabilizes the deformation microstructure, i.e. the structure is stabilized by balancing the driving and pinning forces controlling the rate of triple junction motion. As a consequence, recovery and the subsequent recrystallization are strongly retarded. The mechanisms underlying Y-junction motion and its pinning are analyzed and discussed.

General information
Publication status: Published
Organisations: Department of Wind Energy, Materials science and characterization
Contributors: Yu, T., Hughes, D. A., Hansen, N., Huang, X.
Number of pages: 10
Pages: 269-278
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Acta Materialia
Volume: 86
ISSN (Print): 1359-6454
Ratings:
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 5.22 SJR 3.417 SNIP 2.795
Web of Science (2015): Impact factor 5.058
Web of Science (2015): Indexed yes
Original language: English
Keywords: Aluminum, Annealing, Deformation structure, Transmission electron microscopy (TEM), Triple junction, Cold rolling, Deformation, Electron microscopy, Metal cladding, Transmission electron microscopy, Cold-rolled aluminum, Deformation microstructure, In-situ observations, Lamellar boundaries, Migration patterns, Recovery mechanisms, Recovery
Electronic versions:
In_situ_observation_preprint.pdf. Embargo ended: 10/01/2017
DOIs: 10.1016/j.actamat.2014.12.014

Bibliographical note
The authors gratefully acknowledge the support from the Danish National Research Foundation (Grant No. DNRF86-5) and the National Natural Science Foundation of China (Grant No. 51261130091) to the Danish–Chinese Center for Nanometals, within which this work has been performed.
Source: FindIt
Source-ID: 273872777
Research output: Contribution to journal › Journal article – Annual report year: 2015 › Research › peer-review