Effect of FSW parameters on the evolution of swirl zone grain structure during post-weld heat treatment of commercial purity aluminum*

Dr. Bala Radhakrishnan[1]; Dr. Gorti Sarma[1]; Dr. Oleg Barabash[2]; Dr. Zhili Feng[2]; Dr. Stan David[2]
[1]Computer Science and Mathematics Division, Oak Ridge National Laboratory, Building 5600, Mail Stop 6008, Oak Ridge, Tennessee 37831-6008 USA
[2]Metals and Ceramics Division, Oak Ridge National Laboratory, Building 4508, Mail Stop 6095, Oak Ridge, Tennessee 37831-6095 USA

The deformation substructures in the swirl zone of commercial purity aluminum as a function welding parameters are analyzed using orientation imaging microscopy to determine the microtexture, grain size distribution and grain misorientation distribution. The orientation scan data consisting of the Euler angle set for each site are used as input to a mesoscale substructure evolution model based on a Monte Carlo technique. The relative subgrain energy and subgrain mobility are expressed as a function of the boundary misorientation. The Monte Carlo simulations are used to predict whether normal or abnormal grin growth will occur during post-weld heat treatment of the substructure. The model predictions are compared with experimental measurements of grain structures obtained after annealing

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