Microanalysis of an industrial Al-Mg-Si alloy by conventional and 3D atom probe

F. Danoix, M.K. Miller*, A. Bigot[+]

Groupe de Physique des Matériaux, UMR 6634, Faculté des Sciences, Université de Rouen, 76821 Mont Saint Aignan Cedex, France
* Microscopy and Microanalytical Sciences Group, Metals and Ceramics Division, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6376, USA
[+] Pechiney CRV, Parc économique Centr'Alp, BP 27, 38 341 Voreppe CEDEX, France

The Al-Mg-Si(Cu) alloy 6016 is used for the majority of aluminum automotive outer panels in Europe. This alloy combines excellent formability in the as-delivered (T4) condition with high strength in service due to the effects of rapid precipitation hardening during paint curing. A variety of precipitates and precipitation sequences have been reported in the literature for Al-Mg-Si(Cu) alloys. The alloy studied here has a much higher Si/Mg ratio than those used in the majority of published studies. Conventional and 3D atom probes have been used to characterize the microstructure after room temperature aging and following artificial aging in the temperature range 145 to 205°C. The accuracy of measurements of precipitate composition, number density and morphology, as well as solid solution levels, are discussed in comparison with existing data from the literature.

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