Atom Probe Tomography Study of GPB zones in Al-Mg-Cu-(Si) Alloys

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Rod-like Guinier-Preston-Bagaryatsky (GPB) and lath-like GPBII zones were previously reported to develop in artificially aged Al-Mg-Cu-(Si) alloys with 0.14 Cu/Mg ratio (wt.%). In the current work, the composition of the zones has been studied with the Local Electrode Atom Probe (LEAP®). Contrary to previous work, the LEAP results show that the earliest forming GPB zones are enriched mostly in Mg and Si; the Cu enrichment is low. In most instances, the GPB zones are found to have an undefined shape. Later in the aging process, the lath-like GPB-II zones were found to be rich in Mg and Si at approximately equal levels, and the Cu level was smaller. Based on these findings, it is proposed that the previously suggested L10-ordering for GPB zones and the one dimensional supercell for GPBII zones should be reconsidered with Mg and Si as the main constituents, but with Cu incorporated into the crystal.