Title: Microstructural characterization of the Al-Li-Mg-Cu alloy using 3-dimensional atom probe tomography

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Preference (delete one): talk

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Short Abstract (limit 200 words):

The mechanical properties and microstructure of Al-Li-Cu-Mg alloys have been studied extensively due to their low density and high stiffness, compared with the conventional aluminium alloys used in aircraft structures. However, the low ductility and toughness of these alloys have restricted their applications. The microstructure and local composition distributions are important for optimizing these mechanical properties. Previous studies have shown that a homogeneous distribution of coherent spherical $\delta'$ (Al$_3$Li) precipitates was formed together with other semi-coherent phases S' (rod or lath-like) and T$_1$ (plate-like) after being aged at 200°C. Because these precipitates are very small, ~20 nm in diameter for the $\delta'$ precipitates and even smaller for the S' and T$_1$ phases in the thickness direction, the accurate compositions of the precipitates in these alloys have not yet been determined. The 3-dimensional atom probe (3DAP) is a unique technique for determining the local composition distribution on a nano-meter scale. In this presentation, we will introduce briefly the 3D atom probes at the Monash Centre for Electron Microscopy, and present detailed studies of the compositions of the various phases in the Al-Li-Mg-Cu alloy analysed using the new generation 3DAP recently installed at the centre.