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# Atom probe tomography study of the growth of a single crystal phase synthesized by an Al molten flux

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Aluminum alloys and intermetallic are being widely investigated as potential aerospace materials. These alloys offer the promise of low density, improved specific strength, high ductility, high fracture toughness and high stiffness to weight ratio. Different light weight elements such as Si, Ca and Mg are commonly added to improve the strength and the ductility of this material. In this study, metal flux has been employed as a synthesize method for a single phases. The considerable potential of aluminum liquid is demonstrated as a powerful synthesis solvent of important intermetallic phases such as:, and *CaMgSi.*

The mechanical properties of the synthesized system have been estimated through the hardness analysis using nano-indentation hardness test. The microstructure evolution and the phase analyses were examined using scanning electron microscopy (SEM) and X-ray diffraction (XRD). The interactions between single crystals and the eutectic microstructure of molten flux is rather complex and yet to be fully understood. Thus, tracing of local chemistry on atomic scale is crucial.The atom probe tomography technique is utilized to characterize the intermediate reaction steps of the flux-grown intermetallic phases. The study proposed a direct approach to investigate the involved reactions during the formation of the synthesized intermetallic phase.