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### **Optimisation thermodynamique du système ternaire Al-C-Mg, application à l'affinement de grains dans les alliages Mg-Al**

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#### **Votre résumé :**

Grain refinement of Mg-Al based alloys is challenging because it is known that Zr, which is extremely effective in many Al-free alloys, cannot be used. The addition of carbon through various routes by using carbon-containing sources is considered as an option. The grain refinement mechanisms are still under debate. The present work is focused on the ternary base system Mg-Al-C, including the potential nucleants  $Al_4C_3$  and  $Al_2MgC_2$ .

The ternary carbide  $Al_2MgC_2$  was synthesized and characterized using sealed Ta crucibles. The decomposition of the carbide was measured at 1290°C by Differential Thermal Analysis under a pressure of 8 bar and heat capacity have been measured. Practical difficulties, including high vapor pressure of Mg and high affinity of Mg with oxygen, as well as rapid hydrolysis of the  $Al_2MgC_2$  carbide have been overcome.

Experimental results, associated with DFT calculations were used in order to propose a first Calphad type optimization of the ternary Al-C-Mg system.

**Mots clés :** Alliage de magnésium, Calphad, Thermodynamique

**Conflits d'intérêts :** None Declared