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MS46 P08

The powder diffractometer of beamline CRISTAL at synchrotron SOLEIL E. Elkaïm[a], F.Legrand[a], G. Guillet[b], H. Mezière[c], S. Ravy[a] [a]*Synchrotron SOLEIL Gif-sur Yvette, France* [b]*Laboratoire de Physique des Solides,Orsay, France*. [c]*Sciences Chimiques, Rennes, France.* E-mail: erik.elkaim@sunchroton-soleil.fr

Keywords: powder, diffractometry, instrument development, powder x-ray diffraction.

Cristal at synchrotron Soleil, is an undulator beamline dedicated to diffraction experiments in the energy range 5-30 keV. It is equipped with 3 diffractometers suitable for most diffraction experiments (powders, single crystals, etc…).

This poster focuses mainly on the powder diffractometer which will start operating at the end of this year. This 2-circles diffractometer built by SMP[1] will be equipped with a 21-crystals multianalyser[2] for high angular resolution experiments. The large dimensions of the instrument will permit studies of samples under various conditions (low temperatures, high temperatures, etc…) with a sample environment carrying capacity of about 60kg on the inner circle.

A particular care has been taken to achieve high precision for this instrument and measurements of the accuracy will be shown. Main characteristics of the diffractometer will be given together with a description of the multianalyser.

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MS46 P09

Kinetics of the precipitation in an AZ91 alloy through *in situ* Xray diffraction analysis Hiba Azzeddine, Saida Abdessameud, Baya Allili & Djamel Bradai, *Faculty of Physics, USTHB, BP 32 El-Alia, Dar El Beida, Algiers, Algeria.* E-mail: bradai_djamel@yahoo.fr

Keywords: AZ91, Xray diffraction, discontinuous precipitation

Magnesium's good properties, such as low density (1.74 g cm^{-3}) and high specific strength, make its alloys potential candidates for replacing steel and other heavier materials [1]. AZ91 is the standard magnesium die-casting alloy, being used in approximately 90% of all magnesium products [2]. The alloy AZ91 can be thought of as being based on the binary magnesium-aluminium system. From the phase diagram this system exhibit a good age hardening response but in reality the relative hardness increase is not so important when compared to the Al-Zn one. The cause of this weak hardness response is the occurrence of both the continuous and discontinuous precipitation reactions. While the first reaction is known to harden the material, the second is responsible of its softening. Discontinuous precipitation lead to a duplex cellular structure of a lamellar $Mg_{17}Al_{12}$ precipitate and a depleted solid solution from the supersaturated one. The continuous precipitation within the grains also consists of the equilibrium $Mg_{17}Al_{12}$ phase that is incoherent plate shaped (Widmänstatten structure) precipitates parallel to the basal plane of the magnesium matrix.

During the last decades, There are several reports describing the microstructures and mechanical properties of AZ91 alloys processed differently (See [3]). Some of these investigations have generally used fairly complex alloy systems where the presence of substantial alloying additions leads to the widespread dispersion of intermetallic precipitates. However very little work has been devoted to the determination of the macroscopic kinetics of the discontinuous reaction in important industrial alloys such as AZ91. In this work, we present the results of an extensive in situ determination of the kinetics of the DP reaction through Xray diffraction analysis. The results show a good agreement with a previous work in a model binary system [4].

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