Precipitation sequence study in the Ce-Mg-Zn system using powder neutron diffraction

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In our previous beamtime we investigated the solidification of four samples. Diffraction patterns were collected at selected temperatures during cooling from a temperature at which the sample was molten. Super-cooling and preferred orientation/large grain formation during during solidification were observed for some of the samples. Furthermore, the temperatures at which diffraction patterns were acquired for each sample were far apart (more than 50^{o}C in some cases), making the determination of transformation temperatures less accurate.

In this study, diffraction patterns were acquired every 5 ^{o}C for each sample in order to determine transformation temperatures more accurately. In addition, a motor was installed on the furnace to vibrate the sample during solidification in an effort to reduce supercooling and the development of preferred orientation/large grains.

Fig.1 shows four calculated vertical sections through the ternary phase diagrams along with all transformation temperatures obtained in this experiment (dots). The measured transformation temperatures as well as the precipitation sequences are in agreement with our calculations.

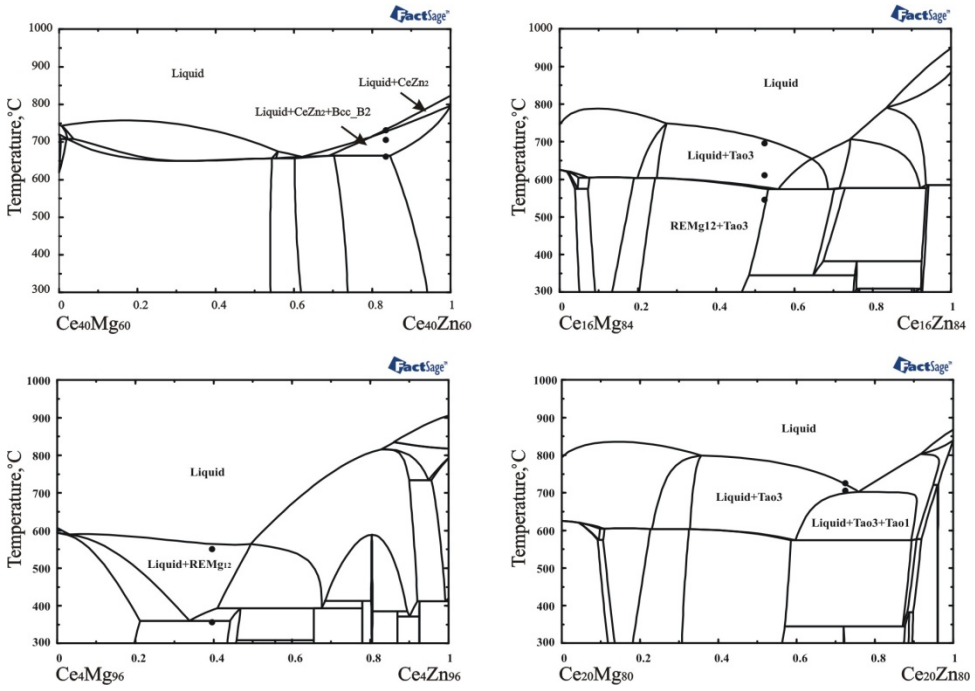

Figure 1. Calculated vertical sections of Ce-Mg-Zn system along with experimental data (this work).