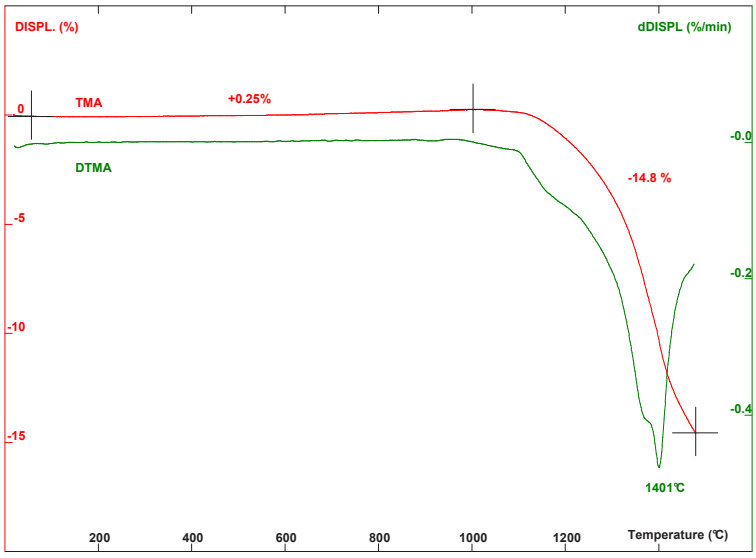
Sintering of $MoSI_2$

INTRODUCTION

Some metallic parts are made using powder sintering processes, like those manufactured by 3D printing. These processes are preferred when it is necessary to save costly raw materials, or to manufacture lighter and more complex design parts. During sintering, the dimensions of the part change. TMA is used to measure the powder's expansion, shrinkage, and the final part's density. Our vertical TMAs preserve the sample's integrity before the experiment starts, thanks to the application of very low loads.

EXPERIMENT

A compacted $MoSi_2$ powder sample of 3.94 mm was heated up to 1500°C at 5 K/min.
Gas : helium.
Applied load : 2 g, to avoid any sample deformation before the experiment started.
Probe : alumina.



RESULTS AND CONCLUSION

The sample shows a slight thermal expansion up to 1000°C followed by a shrinkage of 14.8% at 1500°C. This shrinkage is dure to the powder's sintering. The maximum sintering rate is 0.5 %/min at 1401°C.

INSTRUMENT

THEMYS TMA

PRESERVATION OF SAMPLES
due to low load vertical TMA system.

ULTRA-HIGH TEMPERATURE CAPABILITY
to 2400°C with a single furnace.

MODULAR ADAPTIONS ALLOWING
TGA only, DTA only, TG-DTA, and TMA up to 2400°C, DSC only and TG-DSC up to 1600°C all in one instrument.

EXTERNAL COUPLING CAPABILITY
designed for evolved gas analyzers (FTIR, MS, GCMS, MSFTIR, or FTIR-GCMS)