## Thermal Expansion Behavior of an Inconel 740 Series Using a Push-Rod Dilatometer

Daeho Kim<sup>s</sup> and Sanghyun Lee<sup>c</sup>

Division of Physical Metrology, Korea Research Institute of Standards and Science, Daejeon, Korea leesh@kriss.re.kr

## Jinyoo Suh

High Temperature Energy Materials Research Center, Korea Institute of Science and Technology, Seoul, Korea

The coefficient of thermal expansion (CTE) is a very important value in developing new alloys and mechanical design among solid materials. As a growth technology, nickel-based alloys are used in many fields, for example high temperature boiler tubes, jet engine, nuclear power plants, and so on. Inconel alloy 740 is one of the representative alloys which have a gamma-prime phase with aluminum (AI) and titanium (Ti). In this study, we measured the CTE of an Inconel 740 series which was modified with the composition of AI and Ti. Varied samples are three types. One sample included AI (0.8-1.3 wt. %) that was more weight percent than Inconel 740, another sample included Ti (2.5-3.0 wt. %), and the other included approximately two times more of AI and Ti. All compositions of samples were investigated on SEM-EDS. Measuring CTE of the samples were conducted by a commercial push-rod dilatometer (Netzsch, DIL 402C). Al<sub>2</sub>O<sub>3</sub> reference material was used for initial measurement of correction CTE value, and samples were measured after that. We analyzed the thermal expansion behavior in the temperature range from 100 °C to 850 °C in the heating mode. All samples had the CTE behavior in the range (8 ~ 20) x10<sup>-6</sup> K<sup>-1</sup>, and the curves had commonly two transition points near 550 °C and 730 °C. It can be assumed that the gamma-prime phase in the samples with Al and Ti is the effect of different CTE behavior.

## References:

[1] J.J deBarbadillo. Materials for Ultra-Supercritical and Advanced Ultra-Supercritical Power Plants, Woodhead publishing, 2017 Chapter 14.