

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 1020-a  
No. +++

## High Nickel Alloy for EPMA

This certified reference material (CRM) is produced in accordance with the NMIJ's management system and is in compliance with ISO 17034 and ISO/IEC 17025. This CRM is intended for use in the calibration of the concentration of elements during the electron probe micro analyzer (EPMA) analysis of Cr, Ni, and Fe in high Nickel Alloy.

**Certified Values**

The certified values for Cr, Ni, and Fe in this CRM are given in the table below. The uncertainty of the certified value is the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor ( $k$ ) of 2, and it is the half-width of an interval estimated to have a level of confidence of approximately 95 %.

	Certified value Mass Fraction (%)	Expanded uncertainty Mass Fraction (%)
Cr	29.85	0.08
Ni	60.05	0.13
Fe	10.03	0.04

**Analysis**

The certified values of this CRM were based on the results of the following analytical methods:

- (1) Titration analysis
- (2) EPMA analysis

(accelerating voltage: 20 kV, beam diameter: 1.2  $\mu\text{m}$ )

The characteristic value was determined by the titration analysis. The standard uncertainty for the certified value of this CRM includes the uncertainty due to the titration analysis, the uncertainty due to the EPMA analysis, and the homogeneity between specimens determined by the EPMA analysis.

**Metrological Traceability**

The certified values were determined by titration as the primary method of measurement with NMIJ primary standard solutions of Cr, Ni, and Fe. It is traceable to the International System of Units (SI).

**Expiration of Certification**

This certificate is valid for one year from the date of shipment, provided that the material is stored in accordance with the instructions given in this certificate.

**Description of the Material**

This CRM is in the form of a rectangular tip with 3 mm  $\times$  10 mm  $\times$  15 mm, packaged in a plastic container.

**Instructions for Storage**

The CRM should be kept in a dry and clean atmosphere such as in a desiccator at a temperature between 5  $^{\circ}\text{C}$  and 35  $^{\circ}\text{C}$ .

**Instructions for Use**

When used for EPMA measurement, use the mirror surface after polishing. From the viewpoint of homogeneity, the certified values of this standard substance are values representing the whole sample. When using for EPMA measurement, point analysis should be performed for multiple positions and the average value should be used.

**Precautions for Handling**

In order to avoid surface contamination of the CRM, appropriate tools such as clean gloves and tweezers should be used in handling. Refer to the safety data sheet (SDS) on this CRM before use.

**Preparation**

This CRM was made by Sumitomo Metal Technology, Inc. High-purity electrolytic Fe, Cr, and Ni were mixed. High-purity graphite carbon was added to avoid the formation of oxide. The specimens were produced from several procedures (dissolution by induction furnace in vacuum, hot forging, hot rolling, and annealing) followed by cutting.

**NMIJ Analysts**

Technical managers for this CRM are KOJIMA I. and HIOKI A. The production manager is TERAUCHI S. The analysts are HIOKI A., TERAUCHI S., and ITO M.

**Information**

If substantive technical changes occur that affect the certification before the expiration of this certificate, NMIJ will notify the registered customer. Customer registration on the NMIJ Website (given below) will facilitate notification. Technical reports regarding this CRM can be obtained from the contact details given below.

**Reproduction of Certificate**

In reproducing this certificate, it should be clearly indicated that the document is a copy.

April 1, 2020

ISHIMURA Kazuhiko

President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:  
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National Metrology Institute of Japan,  
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**Revision history**

April 1, 2015: "Metrology Management Center" was renamed to "Center for Quality Management of Metrology."

February 13, 2018: The description in "Expiration of Certification" was changed to "one year from the date of shipment."

March 15, 2024: The number of significant digits in the certified values has been reviewed.