



**International
Standard**

ISO 5820

**Microbeam analysis — Hyper-
dimensional data file specification
(HMSA)**

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Foreword

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Most if not all commercial microanalysis systems acquire and store data in proprietary formats. This hinders the transfer of data between instruments and or between laboratories, such as might be required for multi-technique analyses, round robin studies or collaborations. It is possible that even software from the same manufacturer but for different generations of instruments does not store data in compatible formats. This makes the archiving of data extremely difficult beyond the lifetime of the supported system. The format in this document has been developed by an independent group of experts from the Microscopy Society of America (MSA), the US Micro-Analysis Society (MAS), and the Australian Microbeam Analysis Society (AMAS) to be fully transferrable and archivable. It is independent of instrument manufacturer, computer hardware and operating system.

An existing standard (ISO 22029) allows for platform independent transfer and archiving of simple x-ray spectral data, but the increasing capabilities of microanalysis systems to acquire multi-dimensional signals in parallel has made this standard insufficient to meet all current needs. This standard has been written to meet these expanded requirements.

Microbeam analysis — Hyper-dimensional data file specification (HMSA)

1 Scope

The MSA/MAS/AMAS hyper-dimensional data file specification (HMSA, for short) is a platform-independent data format to permit the exchange of hyper-dimensional microscopy and microanalytical data between different software applications. The applications include, but are not limited to:

- Hyper-spectral maps, such as electron energy loss spectroscopy (EELS), energy dispersive x-ray spectrometry (XEDS), or cathodoluminescence spectroscopy (CL).
- 'Hyper-image' maps, such as pattern maps using electron backscatter diffraction (EBSD) or convergent beam electron diffraction (CBED).
- 3-dimensional maps, such as confocal microscopy, or focused ion beam (FIB) serial section maps.
- 4-dimensional maps, such as double-tilt electron tomography.
- Time-resolved microscopy and spectroscopy.

In addition to storing hyper-dimensional data, the HMSA file format is applicable for storing conventional microscopy and microanalysis data, such as spectra, line profiles, images, and quantitative analyses, as well as experimental conditions and other metadata.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Overview

4.1 Design Considerations

The following requirements were considered in the design of this file format:

- a) Modern experimental apparatus produce data with high dimensionality, such as spectral maps and 3D serial section maps. Therefore, this file format shall store data of high dimensionality.