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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 33838-2017

**Microbeam analysis -- Scanning electron microscopy --
Methods of evaluating image sharpness**

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses the translation method equivalent to ISO /T S24597..2011 "Micro-beam analysis scanning electron microscopy image sharpness evaluation side law".

And the normative reference in this standard international documents are consistent with the relationship between China's documents are as follows.

Microscopic analysis - Scanning electron microscopy (ISO 22493..2008, IDT) GB/T 21636-2008.

This standard is proposed by the National Microparraph Analysis Standardization Technical Committee (SAC/TC38).

The drafting of this standard. School of Physics, University of Science and Technology of China.

1 Scope

This standard specifies three methods for evaluating the sharpness of digital images generated by scanning electron microscopy (SEM). Fourier transform (FT)

Method, contrast - gradient (CG) method, derivative (DR) method.

2 normative reference documents

The following documents are indispensable for the application of this document. For dated references, only the dated edition applies to this article

Pieces. For undated references, the latest edition (including all modifications) applies to this document.

GB/T 27025-2008 General requirements for testing and calibration laboratory capabilities

(ISO /IEC 17025..2005, IDT)

GB/T 27788-2011 Microbeam analysis Scanning electron microscope image magnification calibration guidelines (ISO 16700..2004, IDT)

ISO 22493 Microbeam analysis-Scanningelectron micro-
scopy-vocabulary

3 terms and definitions

GB/T 27788-2011 and ISO 22493 are defined and the following terms and definitions apply to this document.

3.1

Pixel pixel

The smallest imaging unit can not be subdivided in the digital SEM image.

3.2

Pixel size pixelsize

The length of the sample per unit pixel in the SEM image, in nanometer (nm).

Note. The horizontal and vertical pixels should be the same size.

3.3

Binary SEM image binarySEMimage

There are only two gray-scale SEM images after conversion.

3.4

Convolved image

The image obtained by convolution of the binary SEM image and the two - dimensional Gaussian distribution.

3.5

Sharpness factor

(2σ) for generating the standard deviation of the Gaussian distribution of the convolution image.

3.6

Image sharpness (image clarity) imagesharpness

The sharpness factor is divided by the square root of 2 (ie, $2\sigma/2$), and the sharpness factor of the SEM image is considered to be equal to the Gaussian distribution with the

standard deviation sigma

Into the same convolution image.

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