



## APPLICATION NOTE

# SBA 458 *Nemesis*® – Broadening of the Acceptable Sample Geometry Range

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1 SBA 458 *Nemesis*®

### New

With the SBA 458 *Nemesis*® (figure 1), both the Seebeck coefficient and the electrical conductivity can be measured by using various sample geometries and dimensions. These include round, rod, rectangular, square and thin layer samples with the following dimensions:

- $\varnothing$ : 12.7 ... 25.4 mm
- □: 12.7 ... 25.4 x 2.0 ... 25.4 mm
- Thickness:  $\leq$  2 mm

The instrument also allows for the measurement of large LFA samples of 12.7 mm and larger.

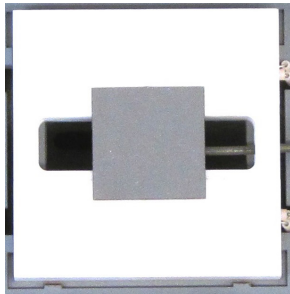
With the new software version, even square samples with the dimensions of 10 x 10 mm can now be measured in the SBA 458 *Nemesis*®. This sample dimension is also among the acceptable sample sizes for LFA measurements. It is therefore now possible to use such samples for both LFA and SBA measurements. There is no longer any need for additional sample preparation work to adjust the sample geometry; the figure of merit can be determined using a single sample.

### Easy Realization

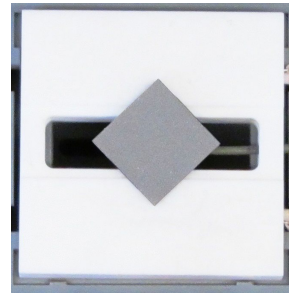
Insertion of samples is very easy and requires no tools – even for 10 x 10 mm square samples. All samples 12.7 mm and larger must be positioned symmetrically on the sample support (figure 2). For this sample position, „rectangular“ should be selected as the sample geometry in the SBA 458 measuring software.

Samples with the dimensions 10 x 10 mm are also to be positioned centrally on the sample support, but rotated by 45° (figure 3). This sample position is called “square diagonal” in the measurement software of the SBA 458. Selection of this sample position applies a correction function, adjusted accordingly, on the basis of which the electrical conductivity can be determined precisely – even for this sample position.

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2 Position of the sample on the sample support when sample dimension is > 12.7 mm



3 Position of the sample on the sample support with a sample dimension of 10 x 10 mm

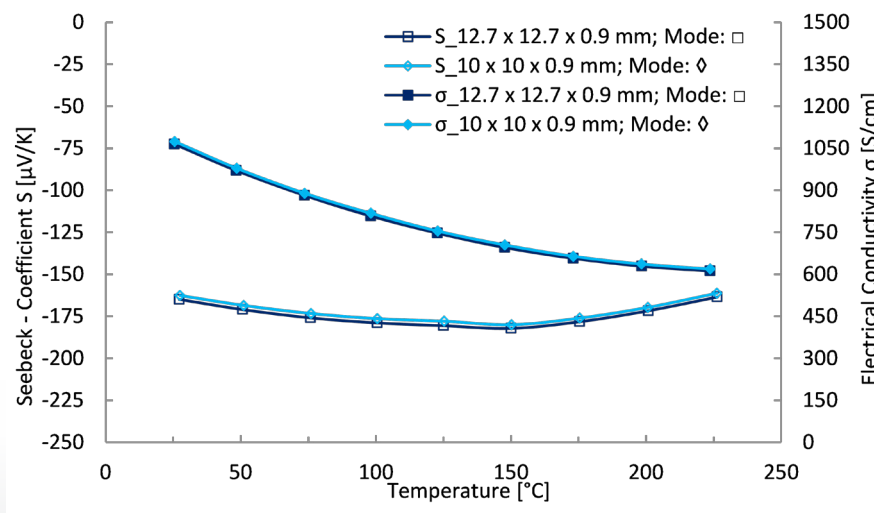
### Measurements

Here, two BiTe samples from the same batch with the dimensions 12.7 x 12.7 x 0.9 mm and 10 x 10 x 0.9 mm were measured using the SBA 458 *Nemesis*<sup>®</sup> and the results were compared. As described above, the 12.7 mm square sample was measured in the symmetrical sample position with the software setting “rectangular”, and the 10 mm square sample was measured positioned centrally and rotated by 45° with the software setting “square diagonal”. The following diagram (figure 4) shows the high level of agreement between the two samples in measurements of both the Seebeck coefficient and the electrical conductivity.

### Overview

With the SBA 458 *Nemesis*<sup>®</sup>, the following sample dimensions can be measured with the new software (version 1.4.1 and up):

- Ø: 12.7 ... 25.4 mm
- □: 12.7 ... 25.4 x 2.0 ... 25.4 mm
- Additionally: square 10 x 10 mm
- Thickness: ≤ 2 mm



4 Measurement of two BiTe samples with the dimensions 12.7 x 12.7 x 0.9 mm and 10 x 10 x 0.9 mm using the SBA 458