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CERTIFICATE OF ANALYSIS

ERM®-EG001

Antimony implanted silicon

Certified Values		
Quantity	Certified value	Uncertainty
Areal density of Sb atoms / 10^{16} cm^{-2}	4.81 [1)]	± 0.06 [3)]
Isotope amount ratio $n(^{121}Sb)/n(^{123}Sb)$	1.435 [2)]	± 0.006 [4)]

[1)] Unweighted mean value of the means of 4 sets of data obtained with Rutherford Backscattering Spectrometry (RBS), Instrumental Neutron Activation Analysis (INAA) and Inductively Coupled Plasma Isotope Dilution Mass Spectrometry (ICP-IDMS).

[2)] Unweighted mean value of the means of 2 sets of data obtained with INAA and ICP-IDMS.

[3)] Expanded uncertainty $U = k \cdot u_{cert}$ with $k = 2$, corresponding to a level of confidence of about 95%. u_{cert} is the combined standard uncertainty and is estimated from the combined uncertainties of 4 sets of measurements and the uncertainty due to inhomogeneity in fractions of the chip surface of ~ 0.15 mm^2.

[4)] Expanded uncertainty $U_{CRM} = k \cdot u_{cert}$ with $k = 2$. u_{cert} is estimated from the combined uncertainties of 2 sets of data.

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This certificate is valid for one year after purchase.

Sales date:

NOTE

European Reference Material ERM®-EG001 was originally certified as IRMM-302 and BAM-L001 It was produced and certified by Institute for Reference Materials and Measurements (IRMM) and Bundesanstalt für Materialforschung und –prüfung (BAM) according to the principles laid down in the technical guidelines of the European Reference Materials® co-operation agreement between BAM-LGC-IRMM. Information on these guidelines is available on the Internet (http://www.erm-crm.org). Responsible for this certificate is BAM.

Accepted as an ERM®, Berlin, 2004-04-14.

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Informative Values

Quantity	Informative value	Uncertainty [5)]
Areal density of the sum of Si, O and Sb atoms in the oxyde layer / 10^{17} cm $^{-2}$	5.9	± 0.6
Areal density of the sum of Si, O and Sb atoms in the layer corresponding to the projected range of the Sb distribution / 10^{17} cm $^{-2}$	9.9	± 1.0
Areal density of the sum of Si and Sb atoms in the layer corresponding to the width of the Sb distribution (full width at half maximum) / 10^{17} cm^{-2}	6.5	± 0.8

[5)] The stated expanded uncertainties (with k=1) are estimated assuming 10% uncertainty in the stopping power.

DESCRIPTION OF THE SAMPLE

The sample is a 10mm × 10mm silicon chip with a thermally grown surface oxide layer and Sb ions implanted with an energy of 400 keV.

MEAN VALUES OF THE DATA SETS

The numbers in parentheses are combined standard uncertainties u_c of the methods.

Analytical method (lab.)	Areal density of Sb atoms / 10^{16} cm^{-2}	$n(^{121}Sb) / n(^{123}Sb)$
RBS (IRMM)	4.840 (0.046)	
RBS (BAM)	4.805 (0.042)	
INAA (BAM)	4.804 (0.029)	1.435 (0.004)
ICP-IDMS (BAM)	4.784 (0.014)	1.4357 (0.0024)

PARTICIPANTS

Implantation: Forschungszentrum Rossendorf (FZR), Dresden, Germany
Homogeneity: Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany
Certification: Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany
European Commission, Joint Research Centre, Institute for Reference Materials and Measurements (IRMM), Geel, Belgium

INSTRUCTIONS FOR USE

The certified value for the areal density of Sb atoms is valid for fractions of the chip surface down to 0.15 mm^2 in size. If smaller sizes are used for analysis, a sufficient number of different positions must be analysed in order to ensure representative sampling.
The implanted side of the CRM is the polished, reflective one.
THE REFERENCE MATERIAL MUST NOT BE HEATED ABOVE 150 °C.

STORAGE

The material should be stored at ambient conditions in a dry and clean environment.

TECHNICAL REPORT

A detailed technical report describing the analysis procedures and the treatment of the analytical data used to certify ERM®-EG001 is available on request.

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Supply of Reference Materials by Bundesanstalt für Materialforschung und –prüfung:

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