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INTERNATIONAL STANDARD

Semiconductor devices – Micro-electromechanical devices – Part 31: Four-point bending test method for interfacial adhesion energy of layered MEMS materials

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SEMICONDUCTOR DEVICES – MICRO-ELECTROMECHANICAL DEVICES –

Part 31: Four-point bending test method for interfacial adhesion energy of layered MEMS materials

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International Standard IEC 62047-31 has been prepared by subcommittee 47F: Micro-electromechanical systems, of IEC technical committee 47: Semiconductor devices.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
47F/326/FDIS	47F/331RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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- replaced by a revised edition, or
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SEMICONDUCTOR DEVICES – MICRO-ELECTROMECHANICAL DEVICES –

Part 31: Four-point bending test method for interfacial adhesion energy of layered MEMS materials

1 Scope

This part of IEC 62047 specifies a four-point bending test method for measuring interfacial adhesion energy of the weakest interface in the layered micro-electromechanical systems (MEMS) based on the concept of fracture mechanics. In a variety of MEMS devices, there are many layered material interfaces, and their adhesion energies are critical to the reliability of the MEMS devices. The four-point bending test utilizes a pure bending moment applied to a test piece of layered MEMS device, and the interfacial adhesion energy is measured from the critical bending moment for the steady state cracking in the weakest interface. This test method applies to MEMS devices with thin film layers deposited on semiconductor substrates. The total thickness of the thin film layers should be 100 times less than the thickness of a supporting substrate (typically a silicon wafer piece).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

There are no normative references in this document.

3 Terms, definitions, symbols and designations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1.1
energy release rate
G
strain energy per unit surface area, which is released during the incremental growth of a crack

Note 1 to entry: The energy release rate can be regarded as the crack driving force, and its unit is given in J/m^2.

3.1.2
interfacial adhesion energy
G_C
critical energy release rate at the moment of crack extension

Note 1 to entry: Its unit is given in: J/m^2.

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