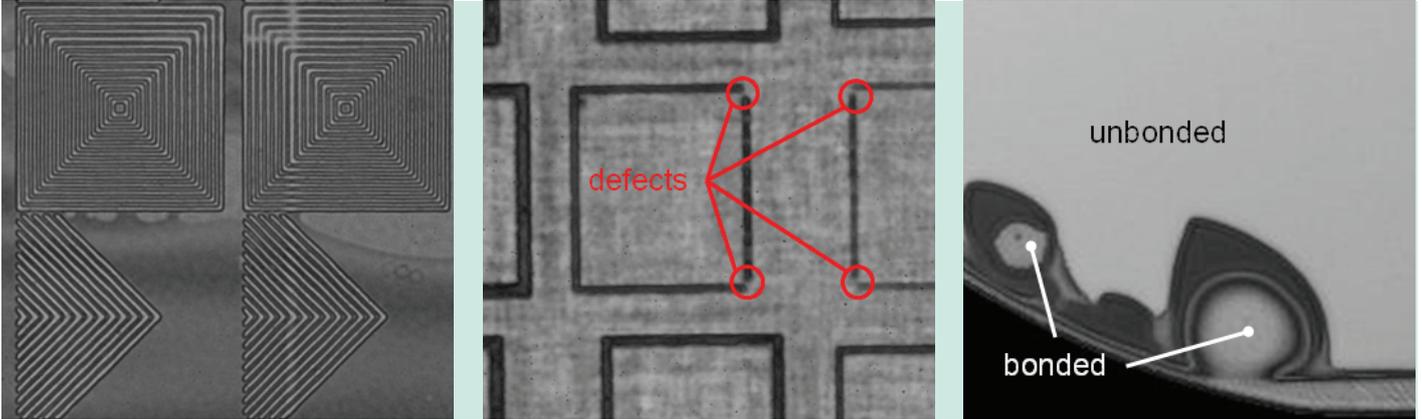


SCANNING ACOUSTIC MICROSCOPY



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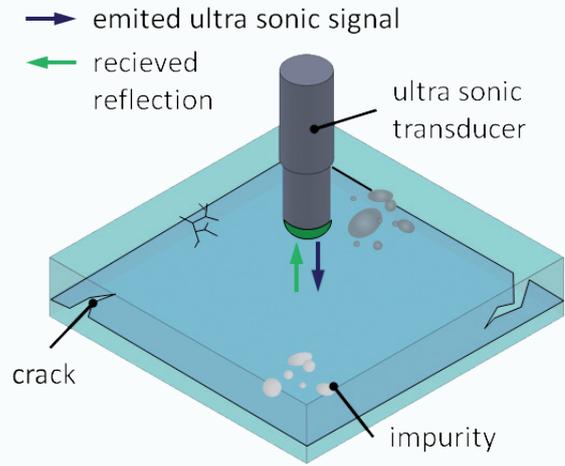
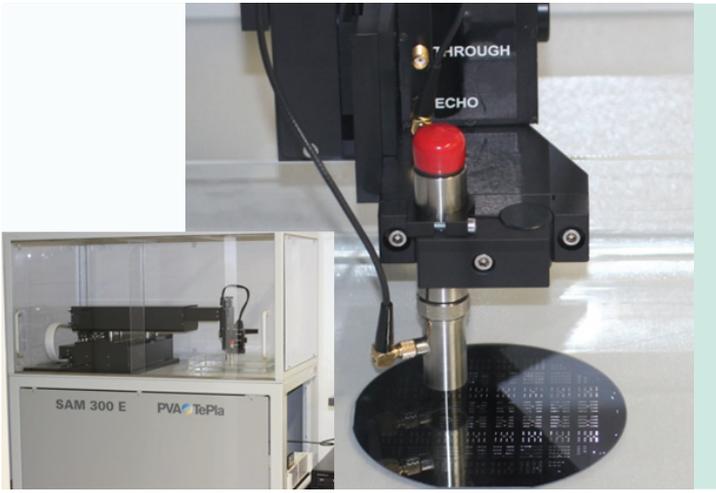
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Description

New applications in the field of micro-systems technology require a hermetically sealed package with a high mechanical strength in order to ensure the functionality of these systems. Bonding defects like voids, air inclusions and impurities in the interface can cause a local degradation of the bond. In addition, due to the formation of cracks the functionality may deteriorate until premature failure of the device. The Scanning Acoustic Microscopy (SAM) is a nondestructive method for the detection of these microscopic and macroscopic defects. It enables the characterization of the bonded interface during the manufacturing process at chip and wafer level and thereby increases the yield. An alternative field of application is the analysis of single chips in order to detect defects directly related to cyclic, thermo-mechanical loading of the MEMS devices for a noninvasive reliability analysis.

Advantages of the test methods

- Nondestructive analysis of chips and wafers with multilayers
- Characterization of system with metallic interlayers
- Detection of defects in housed MEMS (even after thermal cycling)
- Surface analysis using special ultrasonic transducers



Ultrasonic transducers and ultrasonic microscopes

The Fraunhofer ENAS offers analysis using an ultrasonic scanning acoustic microscope SAM 300 E of PVA TePla Analytical Systems GmbH. The measurements can be carried out for chips and wafers with 4", 6", 8" and 12" diameter.

Examples of available ultrasonic transducers with fields of application and specifications (additional transducer heads are available on request):

transducer	depth of penetration	resolution	field of application
110 MHz	large	medium	detection of defects, voids, impurities, cracks in the interfaces of MEMS devices
175 MHz	medium	high	
20 MHz	large	small	
100 MHz	surface	medium	surface characterization
400 MHz	surface	high	

specification	size
Scanning area	320 x 320 mm ²
Waferhalterung	4", 6", 8" and 12"

Figures:

page 1: ultrasonic scans of a glass frit bonded test-structure (left), a SLID bonded metal frame with defects (middle), a partially bonded Si-Si-stack with different intermetallic phases (right).

page 2: Scanning acoustic microscope SAM 300 E at Fraunhofer ENAS and its working principle.

Photo acknowledgments:

Fraunhofer ENAS

All information contained in this datasheet is preliminary and subject to change. Furthermore, the described systems, materials and processes are not commercial products.