

CLAIMS

What is claimed is:

1. A method for nondestructively examining subsurface structures on semiconductor devices comprising:
 - inducing at least an acoustic wave at a first location on an outer surface of a semiconductor device adjacent a structure that is at least partially embedded below the outer surface of the semiconductor device;
 - detecting with a probe laser an effect of the induced acoustic wave at a second location on the outer surface of a semiconductor device, the structure being positioned at least partially between the first and second locations; and,
 - measuring the time the acoustic wave takes to travel from the first location to the second location,
 - repeating the inducing, detecting and measuring steps at a plurality of respective different first and different second positions relative to the structure to identify at least one characteristic of the structure.
2. The method of claim 1, wherein the detecting step includes using the probe laser to measure data representative of at least one of a physical distortion or index of refraction at the second location.
3. The method of claim 1, further comprising determining the frequency of the induced acoustic wave at the second location.
4. The method of claim 1, wherein the step of inducing at least an acoustic wave includes pulsing a pump laser for a first predetermined period of time.
5. The method of claim 4, wherein the first predetermined period of time is between one to one hundred nanoseconds.
6. The method of claim 1, wherein the characteristic of the structure that is identified is a position of the structure.
7. The method of claim 1, wherein the structure is selected from a group consisting of a via and a pillar and wherein the characteristic of the structure that is identified is

selected from a group consisting of data regarding the existence of an abnormality and data regarding a dimension of interest.

8. The method of claim 1, wherein the detecting step occurs within a second predetermined time period that is based at least in part on expected position of the structure relative to the first and second locations.

9. The method of claim 8, wherein the detecting step occurs within a second predetermined time period which is determined at least in part by modeling how long the acoustic wave takes to travel between the first and second locations of the semiconductor substrate as a function of at least two characteristics selected from a group consisting of diameter, depth, shape, structure of the semiconductor substrate, material of the semiconductor substrate, stress in the substrate, position of the structure relative to the first and second positions, material in the structure, and shape of the structure.