## Claims

**1**. A method of generating three-dimensional (3-D) information of a sample using an optical microscope, the method comprising:

varying the distance between the sample and an objective lens of the optical microscope at pre-determined steps;

capturing an image at each pre-determined step, wherein a first surface of the sample and a second surface of the sample are within a field of view of each of the captured images;

determining a characteristic value of each pixel in each captured image;

determining a first captured image that is focused on a first surface of the sample based on the characteristic value of each pixel in each captured image;

determining a measurement of an opening in the first surface of the sample based on the first captured image;

determining a second captured image that is focused on a second surface of the sample based on the characteristics of each pixel in each captured image;

determining a measurement of an opening in the second surface of the sample based on the second captured image; and

determining a distance between the first surface of the sample and the second surface of the sample, wherein the distance between the first surface of the sample and the second surface of the sample indicates the depth of the opening in the sample.

**2**. The method of claim **1**, wherein the opening in the first surface of the sample is an opening area of a bottom of a hole or trench in the sample.

**3**. The method of claim **1**, wherein the opening in the first surface of the sample is an opening area of a top of a hole or trench in the sample.

**4**. The method of claim **1**, wherein the determining of the measurement includes fitting a line to a boundary of the opening in the first surface of the sample shown in the first captured image.

**5**. The method of claim **1**, wherein the measurement is a diameter of the opening in the first surface of the sample.

**6**. The method of claim **1**, wherein the measurement is an area of the opening in the first surface of the sample.

**7**. The method of claim **1**, wherein the measurement is a width of the opening in the first surface of the sample.

**8**. The method of claim **1**, wherein the measurement is a shape of the opening in the first surface of the sample.

**9**. The method of claim **1**, wherein the characteristic of each pixel is intensity.

**10**. The method of claim **1**, wherein the characteristic of each pixel is contrast.

**11**. The method of claim **1**, wherein the characteristic of each pixel is fringe contrast.

**12**. The method of claim **1**, wherein the optical microscope includes a stage, wherein the sample is supported by the stage, wherein the optical microscope is adapted to communicate with a computer system, and wherein the computer system includes a memory device that is adapted to store each captured image.

**13**. The method of claim **1**, wherein the optical microscope is a confocal microscope.

**14**. The method of claim **1**, wherein the optical microscope is a structured illumination microscope.

**15**. The method of claim **1**, wherein the optical microscope is an interferometer microscope.

**16**. The method of claim **1**, wherein the determining a first captured image that is focused on a first surface of the sample, further comprises:

determining, for each captured image, the greatest characteristic across all pixels in the captured image; and

comparing the greatest characteristic for each captured image to determine if a surface of the sample is present at each pre-determined step.

**17**. The method of claim **1**, wherein the determining a first captured image that is focused on a first surface of the sample, further comprises:

determining, for each captured image, a count of pixels that have a characteristic value within a first range, wherein all pixels that do not have a characteristic value within the first range are not included in the count of pixels; and

determining if a surface of the sample is present at each pre-determined step based on the count of pixels for each captured image.

**18**. A three-dimensional (3-D) measurement system, comprising:

a optical microscope comprising a objective lens and a stage, wherein the optical microscope is adapted to vary the distance between a sample supported by the stage and the objective lens of the optical microscope at pre-determined steps; and

a computer system comprising a processor and a storage device, wherein the computer system is adapted to:

store an image captured at each pre-determined step, wherein a first surface of the sample and a second surface of the sample is within a field of view of each image;

determine a characteristic of each pixel in each captured image;

determine a first captured image that is focused on the first surface of the sample based on the characteristics of each pixel in each captured image;

determining a measurement of an opening in the first surface of the sample based on the first captured image;

determining a second captured image that is focused on a second surface of the sample based on the characteristics of each pixel in each captured image;

determining a measurement of an opening in the second surface of the sample based on the second captured image; and

determining a distance between the first surface of the sample and the second surface of the sample, wherein the distance between the first surface of the sample and the second surface of the sample indicates the depth of the opening in the sample.

**19**. A method of generating three-dimensional (3-D) information of a sample using an optical microscope, the method comprising:

varying the distance between the sample and an objective lens of the optical microscope at pre-determined steps;

capturing an image at each pre-determined step, wherein a pattern is projected onto the sample while each image is captured, and wherein a first surface of the sample and a second surface of the sample is within a field of view of each of the captured images;

determining a characteristic value of each pixel in each captured image;

determining a first captured image that is focused on a first surface of the sample based on the characteristic value of each pixel in each captured image, wherein the first captured image is focused at a focal distance;

capturing a second image taken at the focal distance, wherein a pattern is not projected onto the sample while the second image is captured;

determining a measurement of an opening in the first surface of the sample based on the second captured image;

determining a second captured image that is focused on a second surface of the sample based on the characteristics of each pixel in each captured image;

determining a measurement of an opening in the second surface of the sample based on the second captured image; and

determining a distance between the first surface of the sample and the second surface of the sample, wherein the distance between the first surface of the sample and the second surface of the sample indicates the depth of the opening in the sample.